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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Budget and Chemical Interests

IT is a weakness of individuals and sections to regard the Budget each year in its bearing, first of all, on their own interests. What the chemical industry will be more immediately interested in is the decision to continue the Key Industries Duty for a further period of ten years. The most important section of the articles now covered by the Act is that consisting of synthetic organic chemicals, analytical reagents, all other fine chemicals, and chemicals manufactured by fermentation processes, but the protective provisions also include optical glass, optical elements, and optical instruments, scientific glassware, laboratory porcelain, gauges and measuring instruments, and compounds of thorium, cerium and other rare earth metals. The chemical trader class will no doubt resent this extension of the operation of the Act, while the manufacturers of fine chemicals, chemical glassware, etc., will be proportionately gratified. This step will no doubt be claimed as a precedent when the Dyestuffs Act comes up for renewal. Another point of some interest is the decision not to renew the Trades Facilities Act. Under the provisions of this measure, one chemical enterprise of first-class national importance obtained a Government guarantee, as regards principal and interest, of £2,000,000, in connection with the issue in June of last year by Synthetic Ammonia and Nitrates, Ltd., of 5 per cent. debenture stock to that amount. The issue price was £98 and the debentures for some time past have stood at a premium. The great synthetic ammonia works at Billingham-on-Tees are progressing so satisfactorily that even the withdrawal of the guarantee now—though there is no suggestion of such a step—would probably not affect the confidence of the public.

From the general point of view the important parts of Mr. Churchill's second Budget are those that occupy least space in the reports. First and foremost the nation is committed to another year of expenditure at the rate of over eight hundred million, to which must be added local expenditure, bringing the total volume of money poured week by week into the public purse to the enormous sum of £3 per family. The mind of the ordinary individual ceases to function in millions, but it can understand even national finance when it is reduced to the simple terms of £3 per week per family. That is not the worst. The present Budget does nothing to improve national credit and the British Government remains upon a 5 per cent. basis. Hopes of a reduction in the rate of interest are farther off than a year ago and all money for all purposes for another year will remain at the present excessive figure.

Turning to the details of the Budget, there is very little of real importance about which the business man need worry. The abolition of the three years' average in Schedule D of the income tax, however, is a welcome reform long overdue. Generally, the Budget contains useful evidence in support of the theory of sound finance. It shows very clearly how taxation can kill trade and how the absence of taxation can promote trade. In three separate categories, tea, cocoa and super tax, the lowering of the rate of duty has in each case brought more funds into the Treasury. This fact should help our legislators to see the wisdom of improving the national financial position by further remissions of taxation.

Nitrate of Soda Difficulties

ONE of the outstanding features of the past month has been the uncertainty displayed both in commercial and in financial circles as to the future of the nitrate of soda industry. It seems at last to be dawning upon the investing public that the threat of competition from synthetic sources has materialised, while consumers of fertilisers are beginning to appreciate that with nitrate of soda at about £11 15s. per ton, the price per unit of nitrogen is very much higher than is the case with sulphate of ammonia, even though the two materials are now of approximately the same value per ton. It may now be regarded as practically certain that the consumption of nitrate for the coming season will show some considerable decline, for European consumption has been adversely affected by

unfavourable climatic conditions and to an even greater extent by the weakness, which has precluded forward buying, of some of the foreign exchanges. In late years the most important individual consumer has, of course, been the United States, but here again the demand continues unsatisfactory, and it seems probable that consumption during the current year will show a decrease of some 150,000 tons, the total world's consumption showing a decrease of about 300,000 tons, or roughly 12 per cent. in comparison with the previous year.

It is not, however, increasing competition alone against which the nitrate industry has to fight, for it has for years been the butt of a watchful legislation, contributing the bulk of the revenue to the coffers of the Chilean republic. Now, it appears, new legislation has been introduced to compel the nitrate undertakings to share their profits with their employees. That is to say, a company paying 8 per cent. on its capital is called upon to earmark a proportion of any further profit for social betterment. Some of the undertakings have recently declared substantial scrip bonuses, and even if smaller dividends should be paid in the future, the total amount of money distributed may possibly be the same. This action on the part of the nitrate undertakings is probably justified by present and prospective conditions, and it would seem to be a doubtful move on the part of the Chilean Government to harass the industry with legislation of the kind at the present juncture. Even though the demand for synthetic nitrogen is increasing rapidly in those countries which formerly could always be counted upon as natural nitrate consumers, the nitrate undertakings feel fairly confident that they could recapture their markets if they were able to sell at a lower price. There is, however, little time to be lost, for it is fairly common knowledge that an international conference of synthetic producers is to be held at Biarritz in the near future, when the possibility of making a reduction in present prices is to be discussed.

The Burden of the Export Tax

WHAT steps, it may be asked, can be taken by the natural nitrate-producing concerns to lower the selling price of their material? On the production side they have experienced a rise in costs as a result of the recent social legislation referred to, so that the outlook is, if anything, less favourable than when higher prices were ruling. It has been contended that it should be possible to effect a material saving in the cost of recovery. For example, it is found that of the nitrate present in the raw ore, some 25 to 40 per cent. is not recovered, while many of the methods of heating are wasteful. In some cases, too, unnecessary overhead charges are incurred in carrying along high-production-cost oficinas which might possibly be abandoned to make way for lower-cost producers.

When all is said, however, the one obvious direction in which price-lowering could be effected is by a reduction in the Chilean Government export tax. Early in the history of the industry a tax was fixed which represents between 25 and 40 per cent. of the cost of getting nitrate out of Chile. This tax, has, of course, always been the mainstay of the country, and it is said that it represents about 60 per cent. of the whole revenue of the Chilean Government. The view used to be taken that the tax was justified by the fact that the country is gradually being depleted of its natural wealth, but present circumstances seem to indicate that it is defeating its own end by restricting the demand for nitrate. The producers would seem to have a perfectly clear and impartial claim for some relief from the tax, and although a special commission in Chile has recommended a reduction of 10s. per ton in the duty if the producers agree to lower their price by 20s. per ton, the Government has as yet given no indication of its intention to assist in the alleviation of what is undoubtedly a difficult, not to say discouraging, situation.

Sulphuric Acid Prospects

THE complete figures of sulphuric acid production in this country for the year 1925 indicate no very marked change from the conditions of the previous year, though the percentages in some respects show a slight variation. The table below gives the production figures for the years 1914 to 1925 :—

Year.	Output of acid (100 per cent. H_2SO_4) Long Tons.	Percentage made from Pyrites. Imported.	Pyrites. Domestic.	Spent Oxide.	Sulphur.	Zinc and Copper Gases.
1914	1,082,000	88·5	0·45	10·6	0·3	0·15
1917	1,382,000	79·9	0·7	11·0	8·1	0·30
1918	1,380,000	79·4	1·6	11·2	7·4	0·40
1919	883,000	80·3	0·8	15·9	1·8	1·2
1920	1,053,000	80·4	0·9	16·7	1·2	0·8
1921	560,000	71·0	1·0	24·0	3·6	0·4
1922	817,000	61·8	1·1	25·5	9·6	2·0
1923	873,000	51·1	1·1	23·2	21·5	3·1
1924	918,000	48·5	1·0	22·8	23·6	4·1
1925	848,000	45·9	1·0	23·8	23·7	5·6

The first point about the production figure for 1925 is that it represents, so far as can be roughly estimated, not more than about 60 per cent. of the production capacity of the industry. This, in view of the costly nature of the plant, cannot be regarded as a reasonably economic output. The peak figure in the table reached in 1917 was, of course, mainly due to the large Government plants then operating, whereas to-day we believe the only one of such plants still running is the Royal Naval Cordite Factory at Holton Heath, near Poole. The boom that was experienced in 1920 was followed in 1921 by a severe slump, the quantity of acid produced, 560,000 tons, being little more than half the normal output of 1914.

The comparison of the relative sources from which sulphuric acid is made is again interesting. In pre-war days about 90 per cent. of the sulphuric acid we produced was made from pyrites, and the balance almost entirely from spent oxide. Sulphur and zinc in those days were scarcely worth considering. To-day less than 50 per cent. is made from pyrites, 23·8 per cent. from spent oxide, and 23·7 per cent. from sulphur, while zinc has now become a considerable factor, as it accounts for 5·6 per cent. of the total production. These figures confirm the view expressed on previous occasions that the amount of spent oxide used will continue to remain fairly constant. This is the only home-produced source of sulphuric acid and the tendency will be to use the whole of the available

supply in preference to the imported materials which account for the rest of the output. With regard to the use of sulphur, it does not appear likely that any increase will take place in the near future, as its economic use is considered by many to have reached its limit. It is possible and even likely that the amount of acid made from zinc may shortly be doubled. On the whole, however, it is fairly obvious that if there is any substantial increase in the manufacture of acid, a result which everybody naturally desires, the benefit of such an increase would fall almost entirely on pyrites, just as that material suffered most during the slump years.

Roughly speaking, about half the acid manufactured in this country is used in the production of artificial fertilisers, probably about 25 per cent. for superphosphate, and 25 per cent. for sulphate of ammonia, while the rest is distributed amongst the metal pickling and many other industries. The decline in production is due primarily to the great difficulties affecting the British superphosphate industry. The secondary cause is the general depression of trade, particularly in the textile industries.

The present problems which the sulphuric acid trade has to face are mainly two:—(1) the fact that it has become practically impossible to make superphosphate in England at a profit, and (2) the possible production in increased quantities of synthetic sulphate of ammonia. For example, at the great works at Billingham-on-Tees, it is understood that no acid is required for the production of ammonia and that the necessary supplies of the radicle are obtained from gypsum, of which deposits have been found in the district.

Although there is no reason to take an unduly pessimistic view, it is impossible to ignore the position that might arise if the British acid producing industry were reduced from a primary to a secondary position. From the national point of view, in regard to possible contingencies that may arise, it seems very desirable that sulphuric acid manufacture should retain its definite place among our primary industries, and not fall to a secondary or subsidiary rank.

Chemical Engineering Associateship

It is a pleasant reminder of the rapid progress in chemical engineering organisation to hear that the first examination for admission to associate-membership of the Institution is to be held this year. The first paper will be sent out on June 1, and candidates will have the whole of the month in which to complete it. The use of reference books is permissible, but candidates must certify that they have written their replies without further assistance. For those who satisfy the examiners in the first paper, a further examination will follow in London at the end of July, which will partly consist of a *viva voce* test. The fourth annual corporate meeting of the Institution has been fixed for Monday, July 19, at the Central Hall, Westminster. The proceedings, which will be confined to the business of the Institution with an address by the President, are intended to be quite brief, so as to enable the members to take part in the opening of the British Chemical Plant Exhibition the same morning. The annual dinner of the Institution is fixed for the evening. Sir Frederic Nathan has accepted the Council's nomination for the office of president for another year.

Low Temperature Reconstruction

Important reconstruction proposals are published respecting Low Temperature Carbonisation, Ltd., a company which was formed to develop commercially the low temperature process of coal carbonisation, and which has attained results for which rather high claims have occasionally been made. Formed in 1917, Low Temperature Carbonisation became a public company in 1919, in which year the undertakings of British Coalite, Ltd., and Coalite, Ltd., were acquired. It owns a controlling interest in Barnsley Smokeless Fuel Co., Ltd. Meetings are convened for May 3 and 4 to sanction a scheme of arrangement under which the capital will be reduced from £1,275,000 to £162,150 10s. With the exception of the Tully Gas Plant rights, which are to be sold to a new company, Low Temperature Carbonisation will acquire the assets of Gas and Fuel Plants, Ltd., and the latter, as well as the Barnsley Smokeless Fuel Co., will go into liquidation. Fresh capital to the amount of £150,000 is to be created by the issue of 8 per cent. prior lien debenture stock.

Books Received

Department of Scientific and Industrial Research.—Second Report of the Adhesives Research Committee. London: H.M. Stationery Office. Pp. 130. 3s.

Copyright, with Special Reference to Scientific and Technical Papers and Publications. By Evan James Mac-Gillivray. London: The Institute of Chemistry. Pp. 40.

British Standard Specification for Refined Linseed Oil. Published for the British Engineering Standards Association by Crosby Lockwood and Son, London. Pp. 8. 1s. post free, 1s. 2d.

British Standard Specification for Red Lead for Paints. Published for the British Engineering Standards Association by Crosby Lockwood and Son, London. Pp. 6. 1s. Post free, 1s. 2d.

The Calendar

May		
3	Society of Chemical Industry (London Section). Annual Meeting. Discussion on "Modern Portland Cement Manufacture," opened by S. Dickson and R. H. H. Stanger. 8 p.m.	Burlington House, Piccadilly, London
5	Society of Public Analysts: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London
6	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London
6	Royal Society: Election of Fellows. Bakerian Lecture—"Diffuse Matter in Interstellar Space." Professor A. S. Eddington. 4 p.m.	
6, 7	Ceramic Society—Refractory Materials Section	Atlantic Hotel, Newquay
6 & 13	Royal Institution: "The Imperfect Crystallisation of Common Things." Sir William Bragg. 5.15 p.m.	21, Albemarle Street, Piccadilly, London
7	Chemical Engineering Group: Annual General Meeting, 6.30 p.m.	Florence Restaurant, 56, Rupert Street, London, W.1
10–14	Chemists' Exhibition. 11 a.m. to 8 p.m. daily	Holland Park Hall, London
12	Royal Society of Arts: "Industrial Welfare in Practice." Warre S. Bradley. 8 p.m.	John Street, Adelphi, London, W.C.2.
13	Faraday Society: General Discussion on "Explosive Reactions in Gaseous Media." 2.30 p.m.	Institution of Mechanical Engineers, London
13	Optical Society: Ordinary Meeting. 7.30 p.m.	Imperial College of Science and Technology, South Kensington

Review of Recent Research on Adhesives

Advances in Theory and Practice

The investigations which are being carried on under the supervision of the Adhesives Research Committee of the Department of Scientific and Industrial Research are leading to results of great importance. We publish below some account of the recently published report on this work.

THE Department of Scientific and Industrial Research has just issued the *Second Report of the Adhesives Research Committee* (London: H.M. Stationery Office. Pp. 128. 3s.). This volume deals with the investigations carried out under the supervision of the Committee since the publication of its first report in 1922, and it contains, in addition to the report, a number of appendices in which accounts are given, by the workers concerned, of the researches on which the report is based.

Professor S. B. Schryver and his assistants have continued to attack the problem of the constitution and properties of gelatin. Considerable progress has been made in the production of highly purified gelatin and its investigation. A number of steps are involved in the purification: it is first washed with 0·001 *N* hydrochloric acid and then with water; the jelly is then put in water and an electric current passed, which removes the last traces of inorganic electrolytes, and the product thus obtained is characterised by the readiness with which it separates from an aqueous solution; after the electrolytic treatment it is dissolved in water and flocculated by placing it in an electric field in which the poles are separated from the solution by semi-permeable membranes (muslin coated with celloidin). The gelatin thus formed is almost completely insoluble in water at 15°, and is probably free from degradation products. It does not appear to be a protein *sui generis*, but seems to have some resemblance to the globulins. It has, of course, been necessary to submit the product to chemical examination. The analytical methods hitherto used have had certain disadvantages, and a new scheme of analysis has been evolved. This depends largely on the precipitation of the amino-acids (formed from the gelatin by hydrolysis) in the form of the barium salts of their carbamates, which can be obtained by treating the cold solution of the products of hydrolysis alternately with baryta and carbon dioxide. This method promises to give very interesting results, especially as only small quantities of material are needed in its application.

Important Industrial Results

Work which promises to have immediate industrial results has been carried out by Dr. J. C. Kernot. In the first place, he has developed a method whereby gelatin of high quality is extracted from bones in a time much shorter than usual. In the manufacture of glue from bones, the latter are usually treated with steam to clean them and to remove the solvent remaining from the degreasing process. The steam is allowed to remain in contact with the bones for some time, pressure and time varying in different works. Finally water at 100° to 110° C. is run in to extract the glue. As a result of the investigation referred to above, Dr. Kernot (working with Miss N. E. Speer) finds that bones should always be macerated in alkali before extraction, and that in the case of undecalcified bones high pressure for short periods is preferable to low pressure for long periods. Air pressure gives the best results, but if steam has to be used (see above) it should be as dry as possible.

The paper given in appendix 3, "The Production of Glue and Gelatin from Fish," by Dr. Kernot and Miss Speer, is a model of its kind. It gives a masterly survey of the field, and the work done (embodied in a patent) should have important economic results. Fish glues have always been regarded, on account of their low jelly strength, hygroscopicity, and odour, as inferior to glues derived from land animals, though both appear to depend for their adhesive powers on gelatin. For a number of reasons the production of good gelatin and glue from fish and fish residues would be very advantageous to this country. Some of the products of our fishing industry are not used fully, though some are used for meal and fertiliser manufacture. On the other hand, much of the gelatin used for edible and photographic purposes is imported. The most suitable raw material consists of the skins of certain fish, obtainable in quantity from filleting and curing factories. Usually these skins or other fish offal are washed or treated with dilute acid, the glue being extracted by heating with water. As a result the solution obtained contains, in addition to gelatin, other substances such as proteins, fats, and pigments, to which must be attributed the objectionable properties usually associated with fish glue. Still greater impurity is possible where the glue is prepared, not from skins, but from mixed fish offal, such as heads, tails, and bones.

Pure Fish Glue

After many experiments, Dr. Kernot and Miss Speer have evolved the following process (British Patent 235,635) for the production of glue or gelatin from fish skins:—

"The stock is first thoroughly washed in order to remove all soluble mineral salts, especially sodium chloride, and other impurities. After this the skins are macerated in very dilute alkali, the duration of this treatment varying according to the quality of gelatin desired. Only very dilute alkali (e.g., half saturated lime water, or 0·2 per cent. caustic soda) can be used, since fish skins swell considerably in either dilute alkalis or acids, and if concentrated solutions were employed a serious loss of gelatin would probably occur. It is suggested that in practice the skins from cod and haddock should be macerated in the dilute alkali for a period of 24 hours, the alkali being changed three times during this period.

"In order to remove the excess of alkali the skins are then subjected to a second thorough washing followed by maceration in very dilute acid. Good results have been obtained by using dilute solutions of sulphurous acid but in a good many cases the use of hydrochloric acid has been found advantageous, *especially in the manufacture of liquid glue*; the sulphurous acid of course has the advantage that it bleaches the skins and so gives rise to a less coloured gelatin. The duration of the acid treatment may be varied, but large scale experiments have shown that maceration in 0·2 per cent. solution of sulphurous acid for 24 hours has given very good results. The acid solution should be changed at least three times as in the case of the alkali treatment. After the acid treatment the skins should be again washed, if possible, even more thoroughly than before.

"The skins thus prepared are extracted in the same way as is employed for skins of higher animals, except that a considerably lower temperature is sufficient for the digestion, i.e., about 60° C. in place of 80–90° C. The digestion liquors are then filtered, concentrated, bleached (if necessary) and cast into cakes in the ordinary way."

Properties of the Glue

Using skins of cod, ling, haddock, flat fish, and fishes of the shark family, the above method can give a gelatin which is odourless, tasteless, and ready-setting. Very fatty skins, such as that of the catfish, give less excellent results. The adhesive strengths of the glues obtained from various skins have been measured, and it is found that cake glues of this origin are not very greatly dissimilar in this respect to hide or bone glues. For many purposes for which the latter are used these odourless fish glues are also suitable. In some cases the production of gelatin suitable for edible or photographic purposes may be an economic proposition. As compared with the old method, the new method of production involves the extra time (and therefore cost) involved in the washings and macerations, but the increased purity of the product is a more than sufficient compensation for this. The fish glue industry cannot, however, exist independently, but only by working hand in hand with the manufacture of fish meal. In this respect the process outlined above is quite suitable, since the skins from which the glue has been extracted may still be used for the production of meal. Moreover, such fish as are now not landed, owing to their inedibility, might serve as a source of glue, if the residues could be absorbed by the partner industry.

In view of the paucity of knowledge of the nature of adhesion, the paper by Professor J. W. McBain and Dr. D. G. Hopkins on "Adhesives and Adhesive Action" is likely to command much interest. According to these authors there seem to be two problems involved in the study of adhesion: firstly, the character of the bond between adhesive and surface; and secondly, the nature of the adhesive film itself, in virtue of which it is able to transmit the stress between its two surfaces without rupture. An enormous number of experiments, carried out with the most diverse materials, are described and tabulated, including a mass of quantitative data on the strengths of many joints in tension and in shear. The subject, the authors state, is developed under the following headings:

"Relation of strengths of joints to materials; measurement of the tensile strength of adhesive films; the effect of prolonged heating of glue and gelatin solutions on their adhesive power; the effect of the addition of insoluble powdered solids on the strength of wood joints made with various adhesives; experiments to show that specific action or adsorption is not the explanation of joints with porous materials such as wood."

Adhesives and Adhesive Action

The following conclusions are drawn:

"1. Adhesive joints may be placed into two categories, namely, the specific type of true adhesion and the mechanical type of mere embedding. In some joints with porous materials both factors may be operative.

"2. The specific type is formed between smooth non-porous surfaces. According to current conceptions, adhesion of this kind should be accompanied by adsorption, a hypothesis which would appear to have been confirmed in one instance tested. Accumulated evidence tends to show that any fluid which wets a particular surface and which is then converted into a tenacious mass by cooling, evaporation, oxidation, etc., must be regarded as an adhesive for that surface. With the same adhesive between surfaces of various materials there is some evidence of the existence of a parallelism between the strength of the joints and the mechanical properties (tensile strength, compressibility, etc.) of the materials.

"3. The mechanical type of joint is due to the embedding of a tenacious film of the adhesive in the porous surface. The strength of such a joint must depend on the mechanical properties (strength, rigidity, etc.) of the adhesive itself. Evidence of the adsorption of gelatin from its aqueous solution by porous substances, such as wood, filter paper and viscose, would appear to be lacking; also of silicate of soda by filter paper.

"4. The problem of the structure of the film itself as conditioned by the proximity to and interaction with the materials to be joined is perhaps the most intricate of the present investigation. Joints capable of withstanding nearly two tons to the square inch have been set up with a pliable shellac.

"5. Tests of the strength of thin films of adhesive, which yield highly accurate results, reveal not only that the tensile strength of the adhesive is often enormously greater than joints made with various types of test-pieces, but that large changes can be made in the strength of the adhesives before they appear in results with the test-joints. It is suggested that these direct tests of film strength are more significant and unambiguous than any other single test of a glue."

X-Ray and Other Tests

In a report from the Royal Aircraft Establishment mechanical tests of adhesives for timber are discussed. It is concluded that the inconsistencies which are found in timber glue tests are probably due (at least in part) to irregularities in the glue film itself or in its adhesion. To avoid these variations it is necessary to find some way in which may be deduced the true average strength of a joint over a sufficient area. Some interesting results are being obtained with new types of tests, especially one in which a measurement is made of the energy absorbed in fracture of the joint.

In connection with this question of the strength of glued joints, the suggestion has been made by the Research Department, Woolwich Arsenal, that X-ray methods might be of use in estimating the reliability of joints by observation of the distribution of glue. An ordinary glue film cannot be examined by radiological methods, and it is therefore necessary to load the glue with some substance, which, while imparting opacity to X-rays, would not materially affect the properties of the glue or the strength of a joint. Lead sulphate appears to possess the necessary properties, and tests carried out indicate that the radiological method may be of value in detecting defective distribution of glue in joints.

The report shows that the Committee's scheme of work is being developed with marked success. The subject of adhesives is obviously one in which investigations are bound to meet with unusually great difficulties, and it is therefore the more to be regretted that for various reasons the manufacturers have found themselves unable to give the support desired to the investigators. It appears that in 1923 the Department of Scientific and Industrial Research renewed efforts which had been made formerly to secure the formation of an Adhesives Research Association. These efforts failed. It was then hoped that general support might be forthcoming for those researches undertaken by the Committee which had direct industrial bearing. So far as the bone and hide glue industry was concerned, this hope was not realised, as only one large manufacturer responded to the appeal. Makers of fish glues and other users of fish residues did, however, lend financial assistance to the research dealing with their products. For one year from April 1, 1924, this work was prosecuted under the direction of Dr. Kernot, the charges being shared equally between subscriptions from the industry and the Departmental funds. Unfortunately, this arrangement has now lapsed, as sufficient industrial support is no longer obtainable. Yet Dr. Kernot certainly appears to have "delivered the goods." Though it is stated that the future of this branch of the work is uncertain, the hope of the Committee is that means may be found of continuing it.

New Anti-knocking Motor Fuel

According to Dr. G. Grote, writing in the *Chemiker Zeitung* for April 24, new advances have been made in the prevention of "knocking" in motors. The "knocking" is regarded as due to the irregularities in the course of combustion, whereby intermittent increases of pressure occur, giving rise to "detonation." This "detonation" is, however, preceded by spontaneous ignition, which arises through flashing, independent of the electric spark. The difficulties which have arisen through the use of various chemical compounds as "anti-knocks" are well known. In the case of lead tetraethyl they seem to have been largely overcome; but in the case of iron carbonyl (discussed in The Chemical Age a short time ago) the iron oxide formed may give rise to valve obstructions, and, in the form of a slimy deposit, to trouble in the oil system. The German writer points out that the main difficulty with regard to the proper inhibition of knocking is our ignorance of its true cause. Two chemists, Messrs. Tern and Hloch, now claim to have solved this problem. Their investigations lead to the conclusion that the degree of "knocking" is proportional to the insulating power of the fuel used. For example, a mixture of petrol, benzene, and alcohol gives rise to less "knocking" than petrol alone; according to this new view, this is due to the fact that the mixture referred to contains some water, and hence has poorer insulating power than the petrol. It is admitted that lead tetraethyl and iron carbonyl hardly alter the insulating power of the fuel, but it is pointed out that the addition of these substances only prevents the "knocking" due to "detonation," but not disturbances due to self-ignition. Messrs. Tern and Hloch use as "anti-knocks" substances (no indication being given of their nature) by means of which self-ignition and intermittent increases of pressure leading to "detonation" are prevented, while at the same time the explosive power of the fuel is increased. The new fuel is called "Gasin."

New Denaturant for Alcohol

The Italian Government has authorised the use of a new denaturant for alcohol. It is prepared by mixing purified, light ichthyol oils with other substances in varying proportions. After two years' research it has now been officially adopted to supersede the former denaturant which consisted of a mixture of pyridine, methyl alcohol, acetone oil, and benzol. Three parts to 100 parts of alcohol is the ratio employed.

Optical Properties of Linseed Oil

The Technique of Van Eyck and his Followers

AT the monthly meeting of the Oil and Colour Chemists' Association on April 22, held in the rooms of the National Federation of Paint Manufacturers, London, Dr. H. Houlston Morgan (President) in the chair, Professor A. P. Laurie gave a lecture on "The Optical Properties of Linseed Oil and the Technique of Van Eyck and his Followers." The President said that this was the first time that Professor Laurie had honoured the Association with a lecture, but he was well known from his interest in the oil and colour industry and in the craftsman art.

Lowering of Tone in Modern Paintings

Professor LAURIE said that a committee was set up a short time ago by the Royal Academy consisting of artists and chemists with a view to getting information on particular problems which affected the work of the artist. In the discussions between the artists and chemists they came across various troubles. One of the main troubles was the fact that modern pictures painted in oil were found to undergo a considerable lowering of tone after a few years. This went on over the whole surface, but it varied with different painters who followed their own particular methods. This state of affairs in relation to modern pictures was in strong contrast with pictures painted in the fifteenth century by Van Eyck and others, which to the present day retained their brilliancy of tone. Prior to the introduction of painting in oils the mediæval painters painted in tempera, but the paintings of the first painters in oils had produced works which retained their brilliance even to this day, as compared with the loss of tone in so many modern oil paintings.

A great deal had been said about the secrets of the early painters, but if an investigation was made of the historical information available concerning the art in the eleventh and twelfth centuries there was nothing in it to suggest that there were any special methods of preparing the oil or the pigment. The real fact was that Van Eyck and other painters of those days were first-class artists, and the suggestion that there was a tradition, which had grown up during 200 or 300 years from the eleventh or twelfth century onwards, was due more to picturesque writing than to actual fact. Therefore, the committee came to the conclusion that there was no mystery or secret about the methods adopted by the early painters and that the whole matter required looking into afresh.

Some Experiments

Professor LAURIE said that he had tried a few simple experiments in order to get more information on the yellowing of oils used in the painting of pictures. He took artists' flake white and ground it in various oils, including artists' linseed oil which had been bleached in the sun, poppy oil supplied by a good firm, stand oil, copal varnish, etc., and from these experiments certain facts came out. The oil that altered least was the poppy oil; next to that was Dutch stand oil; next came walnut oil; and the one that yellowed most was linseed oil. Copal varnish yellowed more than any of the others, whilst turpentine yellowed worst of all.

It was rather an interesting fact that a great many artists held the view that when they used turpentine as a thinner the tendency was for the oil to yellow more than any other. Artists varnished their pictures with mastic, and he took some of his white lead in oil grindings and put one sample on glass and another on an artist's canvas varnished with mastic. In yet another case he coated the back of the canvas as well as the front with mastic and found that the sample on glass was protected absolutely from the effect of moisture, the sample of canvas coated one side with mastic was fairly well protected, whilst the canvas coated on both sides with mastic was protected very much better. The canvas with mastic on both sides showed a little yellowing, the glass showed a little more, whilst the canvas with mastic on one side only showed the most yellowing of the three.

The important practical bearing of that from the artist's point of view was that when he varnished the front of his picture he did not protect it from moisture at the back, but it was due to the action of moisture or oxygen on certain ketones that yellowing took place and the more the picture was protected back and front the less it would yellow. Copal varnish yellowed considerably; stand oil in which dammar was dissolved, or linseed oil in which mastic was mixed, changed very little in tint and remained remarkably white. Therefore, he put the order as follows:—Poppy oil, stand oil in which dammar had been dissolved; linseed oil mixed with mastic; walnut oil; stand oil; finally linseed oil. These simple elementary experiments gave some practical information to the artist.

It was well known that when an artist painted out a portion of an oil painting, in the course of time the painted out part showed through. There were two explanations of this. One was the permeability of the oil in the pigment, and the other that saponification might be going on slowly between the white lead and the zinc oxide which produced this effect. There was, however, another possibility and that was whether the linseed oil film altered in refractive index. If that were so, it would account for a good deal of the lowering of the tone of oil paintings. Experiments were described which gave a rough classification of the pigments artists used in order of opacity, which might also be regarded as the order of refractive index. If a linseed oil increased in refractive index, as he claimed these experiments showed, then the pigment would be deeper in tone and the whole surface of the picture would be lower in tone. Thus the increase in the refractive index of linseed oil was an important matter in the lowering of the tone in oil paintings after a period of time, and he could not help thinking that in the increase of refractive index of linseed oil there would be found a solution of more than one trouble experienced by the painter in oils.

Discussion

The PRESIDENT, in thanking Professor Laurie for his lecture, said it had taken them back to the fundamental principles underlying some of the oil and colour chemists' business. The present day oil and colour chemist was rather more inclined to consider the problems connected with the manufacture of his materials than the scientific effects underlying the methods of application. It was only by realising and studying these scientific effects that it was possible to manufacture what was required. He could personally substantiate the statement that oils mixed with turpentine showed a greater degree of yellowing than oils not so mixed.

Mr. NOEL HEATON said that although Professor Laurie had stated that there was no mystery about the methods of the Van Eyck school, it was still a subject of tremendous controversy as to how those paintings retained their tone. The early painters were consummate craftsmen, and if work of this character was to be produced it needed the application of scientific technology of the highest degree. Whilst boiled linseed oil was known in the time of Van Eyck the painters of those days started their pictures with a foundation and built the whole thing up in a painstaking manner, which very few present day artists would take the trouble to do. That was the rock bottom secret of the whole matter. The modern artist simply squeezed his colour out of a tube on to a brush and what happened to it afterwards he did not quite know.

Mr. CRUICKSHANK SMITH said it was interesting to hear that poppy oil compared so favourably with the others, because in some experiments of his own certain types of stand oil were quite equal to poppy oil in their resistance to change of tint.

Mr. C. A. KLEIN said it was satisfactory to be told that the failure of modern pictures was due to bad materials. There were indications that craftsmanship was responsible for a good deal of the failure complained of.

The PRESIDENT, referring to the possibly lower standard of craftsmanship in modern times compared with the old masters, suggested that this comparison might be carried too far. When the artists found an oil medium which was very much quicker and easier to use than tempera, the latter went into disuse, and that might account for the difference in the permanence of the tone.

Professor LAURIE briefly replied and was accorded a hearty vote of thanks.

Coloration of Concrete: A New Process Explained

By G. N. White, D.Sc. (Lond.), F.I.C.

THE statement that dyes can be satisfactorily used for colouring concrete has aroused keen interest throughout the building industry. It is as yet too early to estimate how far-reaching may be the results of the new process, but already one may feel fairly confident of its success. It is based upon well-established scientific facts, and any failure will be due to reasons which, at the present time, cannot be explained or foreseen by chemical and physical knowledge.

The new process employs those organic dyestuffs which have the greatest fastness to light, moisture, and other atmospheric effects, and which in the finished state are completely insoluble in water. The colour range of such dyestuffs available for use in the building trade is very extensive, and there seems to be no reason why concrete should not now be tinted to produce any reasonable colour scheme desired by an architect.

The process is simple, and is equally applicable to the colouring of concrete for use in mass or as blocks. The concrete is gauged, not with water and the colour in powder form, but with a solution of some simple derivation of the colouring matter. On exposure to the air or by other simple treatment, the colouring matter is thrown down in a permanent insoluble form upon the cement particles.

The difficulty in colouring concrete by means of pigment in powder form is to grind down the particles of pigment more finely than those of cement. If they are larger, the cement particles will cover them with a cement dust, and tend to produce a greyish effect. But the extreme fineness of cement makes it practically impossible to grind down any pigment into particles that are smaller than those of cement. If this could be done, a colour effect might be obtained with the use of a much smaller quantity of pigment.

This, however, is really the basis of the new process. By working with a solution of a derivative colour or—in rather less exact language—a solution of the colour, one actually employs the pigment in the most perfect state of subdivision possible. Although, on precipitation, there is doubtless a sort of coagulation, the precipitation occurs on the surface of the cement particles. The result is that quite a satisfactory depth of shade can be produced by the use of no more than 0·1 per cent. to 0·6 per cent. of colouring matter, calculated on the dry weight of the concrete.

It is noteworthy that the depth of tint depends only on the ratio of dyestuff to cement; so long as this is constant, it is immaterial—as far as the colour is concerned—to what extent sand or other aggregate is added. Thus, a 7·1 mixture of sand and cement containing 0·06 per cent. of dye has practically the same depth of shade as pure cement containing 0·4 per cent. of dye. This brings out very clearly the dependence of methods of colouring concrete upon the area of the particles to be coloured, since the addition of, say, 86 parts of sand to 14 parts of cement increases the total particle area of the latter by only some 5 per cent.

In practice the method would merely consist in gauging the cement or concrete with a solution instead of with water; and the dyes most suitable for this work would be those that can be brought into solution in the gauging water by simple treatment with a small quantity of alkaline salts. As the gauging is in progress and the concrete is being turned over, oxidation back to the original insoluble dyestuffs takes place, and by the time the concrete is applied the whole mass is coloured right through. In some cases the oxidation occurs with less rapidity, and the concrete may have to be applied before the original dyestuff is thrown down. This, however, presents no difficulty, as the oxidation will be complete before it has finally set.

Although the colouring matters used must of necessity be organic in constitution, this need not involve any fear as to the permanency of the colour; in fact, there are reasons for believing that the organic colours will be more permanent than the general run of pigments. Although it is not possible to speak definitely until the new building material has been tried out for some years, it is reasonable to suppose that a colour which is *on* the cement particles, instead of *between* them, will prove less liable to fade by erosion.

These organic colours also are inert to sulphuretted hydrogen, sulphur dioxide, or other components of the atmosphere of large towns, which might have a darkening or other effect upon mineral colours. This is a most important consideration to architects; for, despite excellent educational work against the evils of domestic smoke, few housing authorities have yet definitely adopted gas fires and other anti-smoke appliances even in their modern garden suburbs.

Considering the process broadly, it would appear to be an important step forward and capable of valuable applications. Apart from the actual colouring of the concrete mixtures, there is the possibility of making tinted aggregates. As the method is also applicable to other building materials—roofing tiles, asbestos, plaster, etc.—it will cover an exceptionally wide field.

It is hoped that a trial on an extensive commercial scale will shortly be undertaken to show the advantages of the method, both for internal and external decoration. Any building scheme adopting it for the first time will be the centre of more than usual interest.

Oxidation of Sulphur Dioxide

To the Editor of THE CHEMICAL AGE.

SIR,—In an article entitled "The Catalytic Preparation of Sulphur Trioxide," which appeared in THE CHEMICAL AGE of September 26, 1925, the author computes the percentage conversion by the equation:

$$\text{Percentage conversion} = \frac{100(a-b)}{a(1-0{\cdot}015b)}.$$

Although I fully appreciate the need for an expression like $a\,(1-0{\cdot}015b)$ in the denominator, I would greatly appreciate your requesting the author to inform me how he obtained the numerical values stated in the foregoing expression.—Yours, etc.,

H. N. CALDERWOOD,
Assistant Professor of Chemistry.

University of Wisconsin, U.S.A., April 1.

[We have submitted the above letter to the writer of the article and append his reply.—ED., *C.A.*]

The volume relation in the oxidation of sulphur dioxide can be represented by

$$2\,SO_2 + O_2 = 2\,SO_3$$
$$2 \text{ vols.} + 1 \text{ vol.} = 2 \text{ vols.}$$

The sulphur trioxide is, however, absorbed before the estimation of the remaining dioxide, so the net result is that each volume of dioxide converted causes a diminution of $\frac{3}{2}$ volume

If $a = \%\ SO_2$ in entrant gas,
$b = \%\ SO_2$ in exit gas,
$x = \%$ conversion,

then in 100 volumes of entrant gas, amount converted $= \frac{ax}{100}$

Volume of gas therefore diminishes by $\frac{3}{2} \cdot \frac{ax}{100}$

$\%\ SO_2$ left in gas is now $\dfrac{100\left(a - \frac{ax}{100}\right)}{100 - \frac{3}{2} \cdot \frac{ax}{100}} = b$

Hence $ax - 100\,a = \frac{3}{2} \cdot \frac{abx}{100} - 100\,b$

$$x = \frac{100\,(a-b)}{a\,(1-0{\cdot}015\,b)}$$

Chemical Research in Russia

To the Editor of THE CHEMICAL AGE.

SIR,—I have read with interest the announcement in THE CHEMICAL AGE of last week concerning the revival of *The Journal of the Russian Physico-Chemical Society*. Will you please inform me what the address of this journal is?—Yours, etc.,

DR. ING. L. DE VASARHELYI,
Judge of the Hungarian Patent Court.

Budapest. April 22.

[Our correspondent is advised to apply to the Secretary of the Russian Physico-Chemical Society, The University, Leningrad, who will no doubt be able to supply full particulars.—ED., *C.A.*]

Weighing in Chemical Works

Importance of Mechanical Construction

As briefly reported in our last issue, a joint meeting of the Birmingham and Midland Section of the Society of Chemical Industry and the Chemical Engineering Group was held at Birmingham on Tuesday, April 20. Mr. D. F. Twiss (chief chemist to the Dunlop Rubber Co.) presided. Two papers were read: "Measuring and Weighing Apparatus as Applied to Chemical Works," by Mr. W. A. Benton, head of the research department of W. and T. Avery, Ltd.; and "Rotameters in Chemical Industry," by Mr. W. Hall-Simmons and Mr. F. Colin Sutton.

Weighing and Measuring

Mr. W. A. Benton spoke of the chemical balance and warned chemists to pay more attention, when purchasing instruments for their laboratories, to the construction of the mechanical parts, the relieving devices and the like, than to extreme sensitivity. Some Continental makers sacrificed reliability, endurance, and real accuracy to sensitivity. Extreme sensitivity was by no means the most important quality in an ordinary laboratory or analytical balance. The head of a large laboratory told him recently that fifteen short beam German instruments had proved to be very defective in spite of the fact that the junior chemists using them were pleased with their great sensitivity and rapid operation. Only the conservatism of chemists prevented the introduction of a simpler and cheaper type of high-class balance in which no errors due to arm inequality could arise. A diagram was shown of such an instrument modified from the original suggestion of Bockholtz. An interesting use, Mr. Benton suggested, of the large precision balance in the immediate future would be the determination of the density of metal ingots. By weighing an ingot in air and in water its relative density could be obtained, and the presence or absence of internal cavities thus inferred—a most important matter for the metallurgist.

In dealing with platforms and weighbridges it was pointed out that a modern high-class weighbridge possessed sensitivity and accuracy of the same order as an ordinary chemical balance, that is, it would turn at a fraction of the total load not greater in amount than one two-hundred-thousandth part of the load. A weighbridge, properly constructed and adjusted, was a marvellously sensitive and accurate instrument. It was quite usual to employ batteries of automatic or semi-automatic feed-weighers to supply the different constituents of a mixture, liquid or solid, or both, and to maintain accurately the relative proportions of the parts. Remarkable results in checking boiler economies were now possible by combining closed water-weighers with coal weighers, so that for each boiler the coal consumption and accompanying water consumption could be ascertained either continuously or over any given period. Too often the real facts were hidden under a cloud of CO_2 readings, thermometer readings and the like.

Rotameters

In the second paper on "Rotameters in Chemical Industry," read for the authors it was pointed out that rotameters indicated continuously the rate of flow through a pipe of any gas or liquid, in cubic feet, gallons, or lb. per hour or per minute, or in any other units required. Rotameters were accurate from the minutest laboratory research instrument up to instruments for mains six feet in diameter; and were made for measuring the flow of acids, alkalis and all corrosive gases and liquids. Laboratory rotameters would measure accurately flows as small as 0·1 litre per hour. The rotameter tube was of glass and was thus suitable for any gas or liquid with the exception of hydrofluoric compounds. When acids, alkalis, or other corrosive substances were dealt with, chemical action on the float and end connections was obviated by the choice of resistant materials. Rotameters for liquids required no temperature correction within ordinary working limits; the error introduced by temperature variations was negligible for all ordinary purposes except when dealing with viscous liquids of such nature that a small variation in temperature was accompanied by a large alteration in viscosity. For accurate laboratory research work, or if the temperature variation was exceptionally large, a correction to the reading could be made readily with the aid of a correction table or curve.

Discussing various manufacturing processes, the paper referred specially to distillation. In every distillation carried on continuously there were only a few factors to be taken into consideration; but the rate of distillation which in many cases governed not only the quality but the quantity of the product, could, by the aid of instruments, be maintained at optimum conditions. There was also a special design of the instrument for liquid ammonia in refrigeration. Rotameters in supply pipes to stills enabled the exact rate of flow to be ascertained continuously and a uniform rate to be maintained. Reactions between gases and liquids could be controlled and many reactions now performed intermittently could be converted to continuous reaction processes. Rotameters in parallel had been used successfully for the maintenance of a definite ratio between two or more gases.

The Government Laboratory

Visit by Institute Members

On Wednesday of last week, by the invitation of Sir Robert Robertson, Government Chemist, the members of the London Section of the Institute of Chemistry had an opportunity of visiting the Government Laboratory in Clement's Inn Passage and of seeing something of its organisation and methods. The guests were received by Sir Robert Robertson and entertained to tea. The visit was arranged for the Institute by Mr. G. S. W. Marlow, the honorary secretary of the section, and the great interest aroused by the event was reflected in the large number of members who attended.

Ever since the Laboratory was made an independent department (a step which was taken in 1911) all Crown offices are entitled to come to it for assistance on chemical questions. In this way it is now consulted by every office under the Crown. Although much of the work of the Laboratory is done in the Clement's Inn Passage building, other of its duties are carried on in the branch laboratory at Custom House, London, which deals with Customs samples; in various chemical stations (at certain ports and inland centres), where Customs samples and some Excise samples are handled; at a laboratory at the Supply Reserve Depot, Deptford, the inspection of food supplies, etc., being done for the War Office; and at the laboratory at the Museum of Practical Geology, where ores are analysed for the Geological Survey. The activities of all these centres form, collectively, the business of the Government Laboratory.

For the Board of Customs and Excise very varied work is done. For example, samples are examined in regard to assessment of duty and drawback and to the manufacture and sale of dutiable articles. One aspect of this work concerns alcoholic beverages and tobacco. Among the less obvious questions which arise may be cited the consideration which had to be given to making methylated spirit more objectionable to the taste, with a view to preventing its use as a beverage. Under the heading of Customs and Excise may be mentioned two branches of work of great interest to chemists, namely, the examination of samples under the Safeguarding of Industries Act and the Dyestuff (Import Regulation) Act. As, under the latter Act, the importation of certain organic dyestuffs and intermediates can only be carried on under licence, the presence of these substances must be sought for in imported colours, lakes and other articles. In regard to the Safeguarding of Industries Act, it is necessary to examine imported chemicals to see if they are taxable, and also to examine medicinal preparations, perfumes and a large variety of other things lest taxable substances enter into their composition.

An interesting phase of the work carried on consists in the examination of foodstuffs. Part of this work is the examination of samples of imported dairy produce and margarine, and of butter and margarine taken at factories in this country, which (with much other work) is carried out for the Ministry of Agriculture and Fisheries. Under the heading of foodstuffs may be mentioned, also, the analyses of substances which are carried out at the request of either party to cases under the Sale of Food and Drugs Acts.

The activities mentioned only form a part of the work of the Laboratory, subject as it is to requests for assistance from any and every Crown Department. In the year ending March 31, 1925, nearly 450,000 samples were examined, of which nearly 130,000 were examined at Clement's Inn Passage.

Low Temperature Carbonisation

Briquetting of the Charge

A PAPER entitled "A Consideration of Processes for the Production of Free-burning Smokeless Fuel Involving the Mechanical Compression or Briquetting of the Charge Before or During Carbonisation" was read on April 22 by Mr. D. Brownlie before the South Wales Institute of Engineers.

The author said that the whole subject of low temperature carbonisation was of vital importance to the British colliery industry, who ought years ago to have established a large central co-operative organisation for detailed study of a number of the most important processes available. The net cost, spread out amongst all the collieries in the country, would be a small matter compared with the resultant advantages. It was well known that methods of low temperature carbonisation involving compression or briquetting of the charge gave a free burning smokeless fuel because of structure, even when the volatile content was less than 3 per cent., just as charcoal was free burning because it was built up of small cells of even size with free cell walls. The pioneer in the modern scientific study of fuel structure in relation to carbonisation was Professor S. W. Parr, of Illinois University, U.S.A.

Classification of Methods

The paper was divided into the following sections :—

(1) Mechanical compression of the viscous charge during carbonisation.

(2) Briquetting by means of a pitch or other externally produced binder, followed by carbonisation.

(3) Briquetting without pitch or other externally produced binder, followed by carbonisation.

Compression of the viscous charge during carbonisation to give a hard and close grained fuel was involved in the L. L. Summers' continuous coking process in which the charge travelled through a long narrow firebrick oven, the charge being subjected to very considerable compression. The modern work in this field for strictly low temperature carbonisation was based on the investigations of Franz Fischer and included in the first place the process of Otto Dobbelstein, of Essen (Germany). This consisted of the mechanically continuous production of hard smokeless low temperature fuel with carbonisation at about 1022° F. (550° C.) for 4 hours, using a special horizontal cylindrical retort built up of alternate transverse thin steel cells 2-3 in. wide and heating chambers 4 in. wide with a loose internal roller ram feed and compression of the charge.

The process of E. Raffloer, of Duisberg (Germany), with carbonisation at about 842° F. (500° C.) for 1 hour, used a special cylindrical retort externally heated and divided inside into a series of long parallel narrow channels or gutters filled with the charge, operated with reciprocating rams and compression. Lastly, in the Meguin A.G. process of Butzbach (Germany) two concentric vertical retorts were used, rotating at relatively high speeds so that the viscous charge was compressed against the inner surface of the outer cylinder by centrifugal force.

Low temperature processes depending on the carbonisation of briquettes made in the ordinary way with pitch had been investigated. One of the best-known processes was the "Smith Carbocoal," which was operated between 1920-1922 on a very large scale at South Clinchfield, in Virginia. The plant, however, was closed down and the process was now being thoroughly re-investigated. It consisted essentially in carbonising for 2½-3 hours bituminous or semi-bituminous coal under low temperature conditions of 1200-1400° F. in an externally heated horizontal retort having an internal screw conveyor. The fuel was then briquetted with pitch and the briquettes carbonised in a high temperature retort of the externally heated, intermittent, inclined firebrick type, for 8 hours at a temperature of approximately 1800° F. The process of the Midland Coal Products, Ltd., of Netherfield, Nottingham, consisted in briquetting small non-coking coals, generally blended with about 30 per cent. coking coal, with pitch as usual and then carbonising the pitch briquettes in a continuous vertical retort, using a blast of steam and air at the bottom to partially gasify the charge, the duration of travel being 5 hours and the maximum temperature zone about 2190° F. (1200° C.).

Briquetting without Pitch

The method of carbonising briquettes without any pitch was used in the "Pure Coal" briquette, primarily the invention of Mr. E. R. Sutcliffe, which was controlled by Sutcliffe, Speakman and Co., Ltd., of Leigh (Lancs). The process depended essentially on briquetting the coal without any binder at high pressures up to 10 tons per square inch. The briquettes were then carbonised in a vertical continuous retort internally heated, generally at a maximum of about 1600-1850° F. by means of a stream of inert gas and steam, the carbonised briquettes being taken out at the bottom after heating for 6-8 hours. The fuel was entirely free-burning, although only containing about 3 per cent. volatile matter, and the oils obtained, 14-20 gallons per ton, were of low temperature composition.

The author described the new process due to Dr. Rudolf Delkeskamp, of Berlin, who claimed that coal or any other carbonaceous material could be briquetted without any binder, merely using the ordinary simple type of briquette press at 1-2 tons per square inch. The principle was entirely novel and used as a binder merely part of the coal itself, which was ground up with water to a colloidal condition and then mixed in with the bulk of the coal. The resulting briquettes were carbonised direct, either at low temperature to give a smokeless free-burning fuel known as "Carburite" or at high temperatures to give "Carburite Coke," which was claimed to be much superior to ordinary coke. Any carbonaceous material could be used as the colloidal binder; bituminous, semi-bituminous, and anthracite coal, canneloid refuse, brown coal, lignites and peat could all be converted into hard briquettes by mixing them with any carbonaceous material, blended or otherwise, in a colloidal condition. The process turned on what was the cost of grinding and how much of the fuel in the colloidal condition was required, but it was believed that anything from 6-20 per cent. of the material had to be colloidalised.

Benzol and By-products, Ltd.

Developments and Prospects

SIR A. HENRY MCMAHON presided at the annual meeting of Benzol and By-Products, Ltd., on Friday, April 23, and financial details will be found in our "Company News" column. He attributed the losses to the difficulties in the coal industry during the year—one of the worst periods in British colliery history.

He was, however, pleased to report that the company had been able to acquire upon most advantageous terms a battery of 35 modern coke-ovens with up-to-date by-product works, including crude benzol, tar, and sulphate of ammonia plants. The freehold area acquired was 132 acres, with about 440 acres of valuable coal leases. The coal supply available, at an output of 800 tons daily, was reported at 30 years' life. It was, moreover, of the richest grade coal for by-product purposes, producing metallurgical coke, which commanded an average of many shillings per ton more than coke of the company's present production. The bulk of this coal produced would be absorbed by the company's own ovens.

Mr. J. A. Davy, general manager, a recognised expert on coke ovens, estimated upon a conservative basis the net profit derivable from this enterprise in normal periods at approximately £12,000 per annum. The company's funds had not been drawn upon in order to effect this purchase. A private subsidiary company had been formed to acquire this undertaking, and the company held the shares therein.

As to the outlook, there was at the moment not much improvement in the coal and coke situation, but export trade was showing recovery, and some by-products had advanced in price. For some months past the business had been making over-all profits. He was hopeful that they had experienced the worst, and if only a satisfactory agreement was concluded within the coal industry we might look forward to a full period of prosperity, together with resumption of dividends, and from their newly-acquired undertaking increased by-product revenue.

Indian Chemical Notes

(From Our Indian Correspondent.)

Mr. Das, M.Sc., Assistant to the Imperial Agricultural Chemist, has been carrying on investigations into the methods of determining the available phosphoric acid of calcareous soils for some time past and has now arrived at some important results. He comes to the conclusion that the potassium carbonate method is a reliable one and has several advantages over the existing Dyer's method when applied to highly calcareous soils. Dyer's method breaks down as a means of estimating available phosphoric acid in calcareous soils. The application of 1 per cent. citric acid solvent in such cases is, in effect, an extraction with a series of dissimilar solutions, the composition of which depends mainly upon the $CaCO_3$ content of the soils.

In the case of available potash, Dyer's method is, at least, unsuitable for those soils whose $CaCO_3$ content ranges from 1-7 per cent.; beyond that, however, the extraction of potash is not materially affected by the presence of $CaCO_3$. The suggestion made by Dyer for the use of an extra amount of citric acid to neutralise the $CaCO_3$ present in calcareous soils, in addition to the usual 1 per cent. citric acid solution, produces results which are not correlated with the known manurial reactions of such soils. This being the case, the values obtained by Dyer's method, in the case of calcareous soils of varying $CaCO_3$ content, cannot be correlated with one another, and far less so with non-calcareous soils. Consequently, the method must be looked upon with suspicion, until a rigorous correlation of the analytical data, with definite manurial reactions of the soils under examination, can be obtained.

Use of Salt Solutions

The second method tried by Mr. Das was with the use of salt solutions. Several salt solutions—such as 1 per cent. neutral ammonium citrate, saturated solution of calcium citrate, saturated solution of calcium citrate and calcium bicarbonate together, 1 per cent. Na_2SO_4, 1 per cent. $(NH_4)_2SO_4$ and 1 per cent. $(NH_4)_2CO_3$ solutions—were employed in the extraction of a non-calcareous Kalianpur soil, mixed with varying proportions of $CaCO_3$ and the calcareous Pusa soil. It was found that in most cases the presence of $CaCO_3$ in any form reduced the amount of P_2O_5 extracted. An exception was noticed in the case of 1 per cent. $(NH_4)_2CO_3$ solution when the effect of the $CaCO_3$ was an indirect one, in that its increasing proportion in the soil mixtures increased the proportion of the solvent to the soil, and, consequently, the solvent, which is alkaline in reaction, extracted more and more humus and increasing amounts of P_2O_5 from the soil mixtures.

It was thought probable that some alkaline solvent, while extracting appreciable amounts of P_2O_5, would be found suitable for the estimation of available P_2O_5 in calcareous soils, as increasing proportions of $CaCO_3$ did not lead to a reduction in the amount of P_2O_5 extracted.

The Potassium Carbonate Method

K_2CO_3 was selected for investigation and it has been proved that 1 per cent. K_2CO_3 solution is capable of differentiating between manured and unmanured plots of known cropping and manurial history, and it thus gives an indication of the probable fertility of calcareous soils in their relation to available phosphoric acid.

It has been established that the underlying principle of the action of 1 per cent. K_2CO_3 solution on calcareous soils is that (*a*) a reaction takes place with any dicalcic of such other phosphates present in the soils in the production of insoluble tricalcium or other phosphate, and of soluble potassium phosphate, and that (*b*) phosphorus in organic combination present in the humus of the soils is also dissolved.

The Paper Pulp Section has continued to do excellent work in experimenting with grasses and bamboos for the manufacture of pulp. There is no doubt that Indian and Burmese bamboos can produce excellent pulp at a cheap rate, and the development of the industry merely awaits the formation of companies adequately equipped with funds and technical knowledge to make the industry a success.

During the period under review the Economic Branch has kept in constant touch with the railways and other commercial interests which are specially interested in the use of the forest products of India, and the inquiries received, not only from India but from other parts of the world, give striking evidence of the valuable work that the Economic Branch has done under the able guidance of Mr. Pearson.

A tan expert was employed for some time and much valuable information regarding the tan values of Indian trees was collected. These were principally chestnuts, oaks, Dipterocarps and the trees of the mangrove forests of India and Burma. Mr. Pilgrim, who was in charge of the tannin investigations, has relinquished his duties after being connected with the Institute for eight years.

Wood working has been much developed at the Institute and many most useful investigations in the properties and uses of Indian timbers have been completed. Thorough training has been given to a number of wood workers and much progress has been made in this line of investigation.

Stream-Line Filtration

A joint meeting of the Nottingham Section of the Society of Chemical Industry and of the Nottingham Society of Engineers was held on Wednesday, April 21. Professor J. W. Hinchley, in a paper on "Stream-Line Filtration," pointed out the necessity of "stream-line" flow for filtration processes, in contrast with "turbulent flow," which was desirable in the transporting of liquids from one vessel to another. He described the development of this method of filtration. The filter proper, he explained, consisted essentially of a pile of closely packed rings of paper or rectangular sheets with the necessary perforations. The pressure exerted on the pile was in certain types controllable and might be varied with the nature of the liquid to be filtered. The actual filtration process might be divided into three stages: (*a*) edge filtrations, (*b*) separation into stream-line, and (*c*) adsorption. If ordinary filter paper was used for the construction of the rings, etc., the efficiency of the filter rapidly diminished owing to the fact that the boundary between the rings became indefinite and the minute passages of flow thereby became either totally or partially blocked. This was prevented by previously preparing the surfaces of the paper. The major portion of the suspended matter was removed by the edges of the rings and might be easily detached by sending a counter current of compressed air through the filter. Professor Hinchley then showed the application of the filter for cleaning oils; in this case the oil was preheated to a temperature of about 80° C., which caused the water to pass off as vapour when the oil to be filtered was pulled through the filter under reduced pressure. The lecture was illustrated by several experiments, on both the laboratory and industrial scale, and also by numerous slides. An excellent discussion followed.

U.S. Potash Production in 1925

Producers of potash in the United States report that the output in 1925 amounted to 51,544 short tons of crude potash salts containing 25,439 short tons of potash (K_2O), according to the U.S. Bureau of Mines. Sales by producers amounted to 52,823 short tons of crude potash containing 25,802 short tons of K_2O—equivalent to just about one-tenth of the potash content of salts imported during the year. The domestic potash materials sold were valued at $1,204,024 f.o.b. plants. About 31,000 short tons of crude potash, with an available content of 10,000 tons of K_2O remained in producers' stocks on December 31, 1925. The production was from natural brines in California, dust from steel plants in Pennsylvania, and distillery residue from molasses at a plant in Maryland. Sales from stock on hand were made by one cement company, but there was no production from cement dust in 1925.

New Source of Aluminium

The Czechoslovak Government is reported to have issued a patent to two local scientists, Otto Lederer and Dr. Walter Stanczak, of Prague, covering a new process for the extraction of aluminium from clay silicate and bauxite. The method has been tested by the Ministry of National Defence, which has reported that aluminium free of iron and silicic acid can be produced from low grade materials at a lower cost than at present.

Key Industries Inquiry

Suggested Continuance of Duties on Fine Chemicals

A PARLIAMENTARY report has been issued of the committee, including Sir Wm. Pope, appointed by the Board of Trade to inquire into the effect of Part I. of the Safeguarding of Industries Act and the question of extending Part I. after its inquiry on August 19.

The committee summarises its conclusions, so far as chemicals, etc., are concerned, as follows :—

1. That in the case of optical glass, optical elements, and optical instruments : (*a*) the duty should be continued ; (*b*) the rate of duty should be increased from 33⅓ to 50 per cent. *ad valorem* ; (*c*) the proportion of the value of goods manufactured in and consigned from within the Empire which is the result of Empire labour should be raised from 25 to 75 per cent. ; (*d*) lenses forming parts of optical instruments should be regarded as separate articles for duty purposes ; and (*e*) component parts of dutiable optical instruments should be also dutiable.

2. That in the case of scientific glassware, lamp-blown ware and laboratory porcelain ; scientific instruments, gauges and measuring instruments ; metallic tungsten, ferro-tungsten, and manufactured products of tungsten, and compounds of thorium, cerium, and other rare earth metals ; and synthetic organic chemicals, analytical reagents, fine chemicals, and chemicals manufactured by fermentation processes : (1) The existing duty should be continued ; and (2) in the case of dutiable scientific instruments the duty should be extended to component parts of such instruments.

8. That in the case of those chemical substances dutiable when of " R " grade in respect of which uncertainty may exist as to whether consignments imported for industrial purposes will be dutiable the Board of Trade should prescribe for each substance the quality which constitutes " R " grade, or alternatively the highest grade of the commercial quality which is not dutiable.

11. That amorphous carbon electrodes should be added to the schedule.

12. That molybdenum, ferro-molybednum, molybdenum compounds other than ores and minerals, vanadium and ferro-vanadium should be added to the schedule.

13. That steps should be taken to render operative all impositions, increases, or extensions of duty recommended as soon as possible after the recommendations are first made public.

14. That the period for which the safeguarding duties are continued should be a minimum of five years and preferably ten years.

The power of the Board of Trade to issue from time to time lists defining articles falling within the scope of the schedule is recommended to be continued.

The Budget

Key Industry Duties Extended

MR. WINSTON CHURCHILL, Chancellor of the Exchequer, presented his second Budget in the House of Commons on Monday. The main features are the following :—

BETTING.—Five per cent. on all legal bets from November 1st. Bookmakers to pay £10 for certificates, with an additional £10 for registration of each set of premises.

MOTOR-CARS.—Additional duties on commercial vehicles.

EXCESS PROFITS DUTY.—To be abolished.

WORKS OF ART.—All goods more than 100 years old, except wines and spirits, to be exempt from duty.

MCKENNA DUTIES.—Extended to commercial motor-cars and wrapping paper.

KEY INDUSTRY DUTY.—To be continued for ten years.

IMPERIAL PREFERENCE.—Ten years' guarantee to be given to all articles now subject to Preference.

INCOME TAX.—Three years average to be abolished in 1927.

ROAD FUND RESERVE.—Sum of £7,000,000 to be transferred to Exchequer.

DIVISION OF TAXATION.—Revenue from motor-car taxation in future to be divided between Road Fund and Exchequer. Exchequer to take one-third yield from private motor-cars and motor-cycles. Whole yield from commercial motors and hackney traffic to go to Road Fund. Amount provided for Road Fund purposes in coming year, £21,000,000. Rural roads to receive an additional £500,000.

BREWERS.—Period of credit reduced from three to two months.

FRENCH DEBT.—France to pay £4,000,000 unconditionally during the current financial year.

TRADE FACILITIES ACT.—Not to be renewed next year.

SINKING FUND.—Redemption provision increased from £50,000,000 to £60,000,000.

Coal and Electricity

Sir A. Duckham on National Plans

A MEETING of the Manchester section of the Society of Chemical Industry was held on Friday, April 23, Mr. L. Guy Radcliffe presiding. Sir Arthur Duckham delivered an address entitled " The Coal Report and the Electricity Bill." There was an attendance of about 200 members and visitors.

Sir Arthur stated that the country might be faced with a national catastrophe on May 1 should the parties to the coal dispute not reach agreement, and it might be yoked to an ill-conceived national experiment in electrification if the Electricity Bill passed Parliament without considerable amendment. In 1900 270 tons of coal were raised per man, while in 1924, after a quarter of a century of improvement in machinery and labour-saving devices, only 220 tons of coal were raised per man employed. The miner was not overpaid, and his wages did not compare favourably with those in other trades in which the work was less arduous and far less dangerous. A reduction of wages should not be pressed for, but stress laid on greater production. As regards development, the mineowner was hampered by the uncertainty of the labour position, and the need for capital. Much could be done to increase the earning capacity of collieries if fresh capital at low interest could be secured. He favoured the grouping of pits for the purpose of centralised coal cleaning, electricity production, gas manufacture and the production of smokeless fuel. Cheap gas was required just as much as cheap electricity, and both could be assured.

The grouping of pits equipped electrically throughout would produce the following results :—1, The delivery of all coal raised to a central station ; 2, the simplification of the cleaning, as an efficient method would be available for using all dirty coals and smalls ; 3, the sale of all surplus electricity, which would be economically produced at a low price per unit, but still highly remunerative to the colliery ; 4, the carbonising of all smalls and slacks to make blastfurnace coke and smokeless fuel for domestic and industrial use ; 5, the sale of all surplus gas ; 6, the sale of the by-products from the carbonising plant ; 7, the dispatch of only well-graded clean coal. Selling organisations should be formed in areas, which should be no greater than 15 per cent. of the whole coal industry. The workers should be represented on such organisations.

The chief objection to the Electricity Bill, which came from the electrical industry itself, was that the Electricity Board would function under entirely uncommercial conditions. He suggested the establishment of area boards instead of national ; the election of at least a proportion of the boards by the interests in the area ; the Electricity Commission to be the technical advisers ; the boards to arrange prices which would allow of a profit being shown ; the boards to meet the representatives of the generators and distributors in general meeting every six months. A scheme based on these lines would have a greater chance of success than the proposals now presented in the Electricity Bill.

Standard Specifications for Paint Materials

THE British Engineering Standards Association has recently issued British Standard Specification No. 217-1926, " Red Lead for Paints," and No. 242-1926, " Refined Linseed Oil for Paints." These specifications contain clauses regulating the composition, together with standard reception tests for the purchase of red lead and refined linseed oil, and appendices giving the methods of carrying out the tests. The specifications have been prepared at the request of paint manufacturers by a committee representative of both buying and manufacturing interests, and, as in the case of all British standard specifications, they will be reviewed as experience in their working or progress in the industry renders it necessary, and revised issues will be published from time to time. Copies of these specifications may be obtained from the B.E.S.A., Publications Department, 28, Victoria Street, London, S.W.1.

New Nitrogenous Fertilisers

Chemists' Work for Agriculture

In the new issue of "Farm Notes," published by the British Sulphate of Ammonia Federation, it is stated that the British farmer will shortly have the choice of many excellent new nitrogenous fertilisers. The progress recently made in methods of fixation of atmospheric nitrogen have led to the production of muriate of ammonia, phosphate of ammonia, urea and other synthetic materials, in addition to the nitrate of lime and ammonium nitrate which have long been manufactured by the arc process.

Synthetic Urea

Perhaps the fertiliser which will call for most attention from the British farmer is synthetic urea, being the most concentrated form of nitrogenous fertiliser which has so far been offered to the cultivator. It is guaranteed to contain 46 per cent. of nitrogen, and this nitrogen being in a readily available organic form is extremely effective. Since synthetic urea is so very rich in nitrogen, great care must be exercised in applying the right quantity. Up to the present practically no large scale experiments have been made with this fertiliser in this country. It is now possible by the latest manufacturing process to produce urea which contains no harmful ingredients and the manure is perfectly safe to use, provided its great strength is borne in mind. Urea is perhaps destined to be one of the most useful of the concentrated nitrogenous fertilisers, first of all on account of its high nitrogen content, thus reducing transport charges; secondly because it does not take up moisture from the air, and is, therefore, always in good condition for application; and it is perfectly safe to use.

Synthetic nitrate of lime is now being produced containing 14½ per cent. of nitrate nitrogen and 1 per cent. of ammonia nitrogen. Nitrate of lime is a very useful nitrogenous fertiliser, especially towards the end of the season when a rapid effect is desired. In quickness of effect nitrate of lime may be compared with nitrate of soda. It is preferable to sulphate of ammonia under certain conditions, for instance, where the lime content of the soil is so low that it would be dangerous to run the risk of further depletion.

German Patents in U.S.A.

In the news edition of *Industrial and Engineering Chemistry*, the following notes on German patents appear:—

"A bill known as H. R. 10820 has been introduced by Mr. Mills of New York and hearings are soon to be held to discuss its provisions. We believe the chemical industry will be particularly interested in Section 9, which provides amendments for a section under the same number of the Trading with-the-Enemy Act. This paragraph reads as follows:—'The Alien Property Custodian is authorised and directed to return to the person entitled thereto, whether or not an enemy or ally of enemy and regardless of the value, any patent, trade-mark, print, label, copyright, or right therein or claim thereto, which was conveyed, transferred, assigned, or delivered to the Alien Property Custodian, or seized by him, and which (1) has not been sold, licensed, or otherwise disposed of under the provisions of this Act, and (2) is not involved (on the date of the enactment of the Settlement of War Claims Act of 1926) in litigation in which the United States, or any agency thereof, is a party.'

"As we read this paragraph, it would mean that while those who have taken licences directly from the Alien Property Custodian are to have their rights and interests protected in case this bill becomes a law, those other chemical manufacturers who were required to take licences from the Chemical Foundation, Inc., because it purchases patents from the Alien Property Custodian, would remain unprotected in case the Supreme Court hands down a decision adverse to the Chemical Foundation. Those who have carefully followed the case can scarcely conceive of this occurring, but nevertheless when technicalities in law are involved, no one can be safe in prophesying. It does seem that if this should take place it is an unfair and unwarranted discrimination to enact laws that leave a very large group of American investors and a large number of American citizens at the mercy of previous owners of patents to whom it would appear such property must be immediately returned if the bill in question passes in its present form. Once more the time presents itself for American industry to be on the alert and proceed to protect itself."

Chemical Matters in Parliament

Low Temperature Carbonisation

Sir H. Brittain (House of Commons, April 26) asked whether all possible assistance would be given to low temperature carbonisation research and processes and whether anything was being done apart from the Greenwich station work.

Sir H. Barnston referred to an answer of May 8, in which he said that a full report would shortly be issued by the Fuel Research Board. He would convey the question about activities elsewhere than at Greenwich to the Secretary for Mines.

Power Alcohol from Beet

Mr. Guinness (House of Commons, April 26), in reply to Mr. Hurd, said that he was unable at present to announce the Government's decision of the establishment of power alcohol production from beet. He was at present considering a scientific report and hoped to make an announcement shortly.

Poison Gas and the Public

Mr. Amery (House of Commons, April 26), in reply to Mr C. Wilson, who questioned the progress in regard to measures for the protection of the public against poison gas, referred only to an answer of February 10. (This stated that measures were under consideration, but it was not in public interests to be more specific.)

Heavy and Rapid Copper Deposition

Electroplaters' and Depositors' Discussion

At a meeting of the Electroplaters' and Depositors' Technical Society held recently, at the Northampton Polytechnic Institute, Mr. S. Field, A.R.C.S., in the chair, there was a discussion on "Heavy and Rapid Copper Deposition." Mr. Sunderland, in opening the discussion, said that his remarks applied almost exclusively to the production of electros for printing purposes, and he proposed dealing only with the sulphate solutions. He advocated making up the solutions by the use of the Beaumé hydrometer, and said that the three combinations necessary to produce good copper were a temperature of about 22° C., density of solution about 19° Beaumé, made up by dissolving the copper salts to 15° Beaumé and then adding acid, and a current density of about 15 amps. per square ft. If higher current densities were used it was necessary to agitate the solutions.

Conditions Controlling Deposit

Mr. F. S. Spiers, speaking of the conditions controlling deposit, said that it was necessary to know the object for which the copper was being produced. If very heavy deposits were required then on the score of time and expense it was necessary to use very high current densities and fairly violent agitation. This could be brought about either by rotating the cathode, or (if this were not possible) by pumping the solution. High current densities brought about the use of much warmer solutions to give good copper, and so he could not agree that temperature was an all-important factor. It was a combination of conditions which was necessary to give a definite result.

Mr. D. J. Macnaughton said that the character of the deposited metal was very important, for all deposits had definite mechanical properties and what was required was that the mechanical property of the metal attained under definite conditions should be known, so that a metal having the required properties could be produced when necessary.

Mr. E. A. Ollard exhibited an electrotype and described the method of production. He also answered a point raised by Mr. Sunderland, who had spoken of the different types of copper obtained when depositing upon a wax mould or upon a metal mould. The explanation was that the structure of the deposited metal was influenced by the structure of the base metal.

Mr. J. W. Perring said that the trouble with the brown powder from the anodes could be got over by adding methyl alcohol to the solution.

The Chairman pointed out that the solution advocated by Mr. Sunderland corresponded to one containing 1½ lb. of copper sulphate and ½ lb. of sulphuric acid per gallon.

The next meeting of the Society will be held at the Northampton Polytechnic Institute on May 12, when a discussion on "Addition Agents" will be opened by Mr. S. Wernick.

From Week to Week

MR. ALFRED WALTER STOKES, public analyst to Bethnal Green B.C. has resigned after 45 years' service.

THE SWEDISH INDUSTRIES FAIR will be held at Gothenburg from May 6 to May 13. Sections will include chemical and pharmaceutical products, oils, paints and enamels, scientific instruments, etc.

GLASGOW UNIVERSITY has conferred the degree of Ph.D. (Faculty of Science) on D. G. Brown, G. S. Ferrier, M. S. Fisher, R. Hay, R. Higgins, J. M. Robertson, J. Montreath Robertson, G. H. Smith, and J. Sword.

MR. BERNARD COLLITT, F.I.C., and Mr. H. J. Roast, who are both Fellows of the Canadian Institute of Chemistry and experienced consulting chemists and metallurgists, have united as Roast and Collitt, consultants, at Montreal.

ALUMINIUM SULPHATE has been the subject of recent experiments by the U.S. Department of Agriculture. It has been found to be an effective protection against root rot, it destroys weeds and actually facilitates plant growth. Experiments are to continue.

THE BRITISH SCIENCE GUILD held its annual meeting on Thursday at the Mansion House, under the presidency of Lord Askwith. Sir Richard Redmayne was to speak on "The Future of the Coal Mining Industry," Dr. E. F. Armstrong on "Dyestuffs," and Captain P. P. Eckersley on "Broadcasting and Electrical Industry."

ARTIFICIAL SILK DEVELOPMENTS are reported from various quarters. Two large plants are to be erected in Japan shortly—The British Enka Co.'s factory at the old aircraft factory at Aintree will have an initial capacity of about 18,000 lb. per day, and the first section should begin production this autumn, with full production next spring.

PROFESSOR JAMES KENDALL, of the Department of Chemistry, Columbia University, has accepted an invitation from New York University to become administrative head of the Department of Chemistry in Washington Square. Dr. William West, Edinburgh University, research assistant to Professor Kendall, will accompany him as instructor.

PROFESSOR S. W. PARR, head of the Division of Industrial Chemistry at the University of Illinois, has been awarded the eighth annual Chandler gold medal for achievement in chemistry. This award is in recognition of Professor Parr's discovery of the method of coking Illinois coal, his invention of the Parr peroxide calorimeter, and his discovery of illium.

THE STAFF OF RESEARCH CONSULTANTS to the Chemical Warfare Service of the United States Army has recently been strengthened by the addition of Messrs. E. R. Weidlein, Director of the Mellon Institute of Industrial Research, C. E. Munroe, Emeritus Professor of Chemistry of George Washington University, J. C. Olsen, secretary of the American Institute of Chemical Engineers, and T. L. Wheeler, a specialist on the activation of carbon for gas masks.

THE AFFAIRS of the British Sugar Manufacturers, Ltd., came before Mr. Justice Astbury, in the Chancery Division on Friday, April 23, on a motion by the plaintiffs in the debenture holders' action, McAlpine against the company, for the appointment of a receiver and manager of the company, his Lordship appointed a receiver and manager with liberty to act for three months, and gave the company leave to move to discharge the receiver on two days' notice.

AT THE NATIONAL GALLERY additional room is now being constructed to house the 42 pictures of the Mond bequest to the nation. Dr. Ludwig Mond stipulated that these pictures should be housed in one room and suggested that his executors should consider some assistance to that end. Sir Alfred Mond and Mr. Robert Mond, on behalf of the family, have interpreted the suggestion very generously and are bearing a considerable part of the cost of the new room, which, designed to give the best possible conditions, will open out of Gallery 6.

A MEETING OF THE CREDITORS of Philli-Mirano, Ltd., manufacturing chemists, Earlsfield, London, S.W., in voluntary liquidation, was held on Wednesday in London. The statement of affairs presented showed assets at book values of £2,091 18s. 10d., which were estimated to realise £961 2s. 2d. The claim of the debenture holder totalled £2,650 3s. 6d. There was a deficiency as regarded the debentures of £1,689 1s. 4d., and there was nothing for the unsecured creditors, whose claims aggregated £4,731 7s. 9d. It was decided to confirm the voluntary liquidation with Mr. Sharpe as liquidator.

IN A TEST CASE from Broxburn relating to the claim of acid workers in the Scottish shale oil industry to unemployment benefit, the umpire under the Unemployment Insurance Acts has decided to allow the claim, and is of the opinion that the sulphuric acid works was a separate department from that of the shale mining, and that the work carried on there was a separate branch of work which is commonly carried on as a separate business from shale mining. There was no dispute in the sulphuric acid works, though the wages in that department might be affected by the result of the dispute in the shale works.

THE NEW CHAIRMAN of Yeadon Urban Council is Mr. H. Jennings, partner in Naylor, Jennings and Co., Green Lane Dyeworks, Yeadon.

MR. J. W. HAWLEY, B.Sc., assistant to Glasgow Corporation Chemist, has been appointed public analyst for the counties of Dumfries, Wigtown, and Kirkcudbright.

A NON-POISONOUS SPRAY for apples, to be known as the Kleno insecticide spray and manufactured by the British and Colonial Chemical Co., Ltd., is being tested by the Home Office.

DR. WILLIAM BLUM, of the U.S. Bureau of Standards, is the first recipient of the American Institute of Chemists' medal, which will be awarded at the annual meeting of the Institute.

SIR W. B. LEISHMAN, F.R.S., Director-General of the Army Medical Services, has been appointed a member of the Medical Research Council. He is one of the pioneers of tropical medicine.

INDUSTRIAL CHEMICALS are to be produced for the first time at a new plant at Bogota, Colombia. According to present plans, initial production will include caustic soda, liquid chlorine, hydrogen peroxide, and glycerine preparations.

SIR ERNEST BENN, chairman of Benn Brothers, Ltd., and Ernest Benn, Ltd., was the guest at a luncheon in London last week following the fifth conference of Editors of works and staff magazines attended by delegates from more than 100 firms.

NEW LABORATORIES have been established by the Pharmaceutical Society at their London headquarters at Bloomsbury Square. The principal work will be to test therapeutic substances which will be scheduled under the Therapeutic Substances Act, 1925.

THE FIRST PERMANENT memorial to the late Lord Leverhulme, in the form of stained glass windows, was unveiled on Sunday in St. George's Congregational Church, Thornton Hough, when Lord and Lady Leverhulme and several directors of Lever Brothers were present. The windows are the gift of the present viscount.

AN ORDER for the installation of Woodall-Duckham vertical retorts for the city of Adelaide, capable of carbonising 160 tons of coal per day, has been placed by the South Australian Gas Co.—Fairfield-Howden Steam Accumulators, Ltd., Glasgow, have supplied plant to Scottish Dyes, Ltd., Grangemouth, with a steam capacity of 10,000 lb. and a volume of 4,950 c. ft.

RECENT WILLS INCLUDE: Mr. G. W. Carter, New Brighton, Cheshire, and Manchester, paint manufacturer, £49,568; Mr. W. E. Smith, Redditch, mineral water manufacturer, £23,921; Mr. G. H. Fraser, of Mahler and Co., iron and steel merchants, and managing director of Pearson and Knowles Coal and Iron Co., £65,939; Mr. W. L. Hargreaves, late chief mechanical engineer of Lever Brothers, Ltd., £12,367.

IN THE CHANCERY DIVISION on Monday Mr. Justice Eve had before him the resumed hearing of the patent case in which Courtaulds, Ltd., ask the Court to revoke two artificial silk patents granted to a Swiss company on the grounds that they are invalid. It is estimated that the case is costing £1,000 a day, and although this was the 44th day of hearing it is not expected that the case will finish this term.

A VISIT is being arranged by the Coke Oven Managers' Association to some important works in France and Belgium in September. It is proposed to leave England on September 3 for the purpose of inspecting the Becker plant and Hurez washer at Drocourt, the synthetic ammonia and alcohol plant at Bethune, and the Packard "Synthol" plant. Other objectives are suggested, including the Sulzer dry quenching process, and fuller particulars will be issued later.

IN THE CHANCERY COURT, Manchester, on Monday the General Engineering Co. (Radcliffe), Ltd., sought an injunction restraining Arthur George Brown, Grosvenor Chambers, Manchester, from asserting or representing that plaintiffs could not manufacture, sell, etc., certain articles without his concurrence as he controlled the patents. The plaintiffs manufactured impregnating plant, vacuum pumps, compressors, etc., and defendant had been an employee. The injunction was granted and it was stated on behalf of the plaintiffs that they did not use a single patent controlled by the defendant.

Obituary

MR. HENRY RIPLEY, aged 76, director of the Bradford Dyers Association.

MR. PHILIP PAIN, head of James Pain and Co., Mitcham, firework manufacturers.

MR. A. J. ATKINSON, of Springcroft, Penyrch, partner in R. W. and A. J. Atkinson, analytical chemists, Cardiff, until his retirement a few years ago.

MR. A. H. SYMINGTON, of Allanton, near Dumfries. A native of Ayrshire, he was for 25 years senior partner in Smith, Stanistreet and Co., chemical manufacturers, Calcutta.

SIR H. C. MANCE, at Oxford, last week, aged 86. He was an important contributor to the technology of electrical science and was a past president of the Institution of Electrical Engineers, and a member of the Physical Society.

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German

ACIDS.—The constitution of dithiocarbonic acids and their salts. A. Hantzsch and W. Bucerius. *Ber.*, April 14, 1926, pp. 793–814.

Preparation of parabanic acid. H. Biltz and G. Schiemann. *Ber.*, April 14, 1926, pp. 721–722.

ALKALI METALS.—The preparation of alkali metals in the pure state. R. Suhrmann and K. Clusius. *Z. anorg. u. allg. Chem.*, April 9, 1926, pp. 52–58.

ANALYSIS.—The microchemical determination of lead. W. Geilmann and R. Höltje. *Z. anorg. u. allg. Chem.*, April 9, 1926, pp. 59–72.

The estimation of small quantities of mercury. A. Stock and R. Heller. *Z. angew. Chem.*, April 15, 1926, pp. 466–468.

The volumetric estimation of chromium and manganese with potassium permanganate in acetic acid solution. Part I. Chromium. B. Reinitzer and P. Conrath. *Z. Anal. Chem.*, No. 3, 1926, pp. 81–114.

BROMINE.—The chemical constants of bromine. K. Jellinek. *Z. anorg. u. allg. Chem.*, April 9, 1926, pp. 16–24.

GENERAL.—The dangerousness of mercury vapour. A. Stock. *Z. angew. Chem.*, April 15, 1926, pp. 461–466.

HALOGEN COMPOUNDS.—A new method for the bromination and iodination of organic compounds. E. Zmaczynski. *Ber.*, April 14, 1926, pp. 710–711.

1 : 5-Dichlor-9-phenyl-anthracene. E. de B. Barnett and M. A. Matthews. *Ber.*, April 14, 1926, pp. 670–679.

OILS.—The polymerisation of fatty oils. Part V. J. Marcusson. *Z. angew. Chem.*, April 15, 1926, pp. 476–479.

The direct synthesis of petroleum hydrocarbons at ordinary pressure. Parts I and II. F. Fischer and H. Tropsch. *Ber.*, April 14, 1926, pp. 830–836.

PEROXIDES.—Organic peroxides. Parts X and XI. H. Gelissen and P. H. Hermans. *Ber.*, April 14, 1926, pp. 662–666.

SUGARS.—Acetone sugars. Part IX. Acetone compounds of rhamnose and mannose. K. Freudenberg and A. Wolf. *Ber.*, April 14, 1926, pp. 836–840.

The constitution of *h*-glucose. H. H. Schlubach and H. von Bomhard. *Ber.*, April 14, 1926, pp. 845–848.

The isomeric *l*- acetochlorglucose. H. H. Schlubach. *Ber.*, April 14, 1926, pp. 840–844.

Miscellaneous

ACIDS.—On some natural amino-acids. P. Karrer and M. Ehrenstein. *Helv. Chim. Acta.*, March, 1926, pp. 323–331.

Preparation of polymethylene dicarboxylic acids containing 11 to 19 carbon atoms and of some of their derivatives. P. Chuit. *Helv. Chim. Acta*, March, 1926, pp. 264–278.

ANALYSIS.—The estimation of arsenic in organic compounds. H. ter Meulen. *Rec. Trav. Chim. Pays-Bas*, April, 1926, pp. 364–367.

The estimation of mercury in the metallic state in organic and inorganic compounds. H. ter Meulen. *Rec. Trav. Chim. Pays-Bas*, April, 1926, pp. 368–370.

COLLOIDS.—The freezing of inorganic hydrogels. J. R. I. Hepburn. *Rec. Trav. Chim. Pays-Bas*, April, 1926, pp. 321–327.

DEHYDROGENATION.—A method for the dehydrogenation of alcohols. F. Zetzsche and P. Zala. *Helv. Chim. Acta*, March, 1926, pp. 288–291.

OXIDATION.—Electrochemical oxidation of ring-chlorinated aromatic hydrocarbons. F. Fichter and M. Adler. *Helv. Chim. Acta*, March, 1926, pp. 279–287.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each

Abstracts of Complete Specifications

249,584. Unsymmetrical Arseno-Benzene Compounds, Process for the Production of. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler 7–9, Weissfrauenstrasse, Frankfurt-on-Main, Germany, and A. Albert, 46, Elisabethstrasse, Munich, Germany. Application date, November 24, 1924.

These unsymmetrical arseno-benzene compounds are obtained by reducing mixtures made up from the following kinds of organic arsenical compounds: (1) Aromatic aldehydo-arsinic acids, aromatic keto-arsinic acids or mixed aliphatic-aromatic keto-arsinic acids or the corresponding arsenoxides of such acids the preparation of which is described in Specifications Nos. 220,668 and 199,091 (see The Chemical Age, Vol. IX, p. 68); (2) condensation products obtained by action of hydrazine or its derivatives on the arsinic acids or arsenoxides mentioned in (1) above and described in Specification No. 199,092 or their arsenoxides prepared as described in Specification No. 199,093 (see The Chemical Age, Vol. IX, p. 68); (3) condensation products obtained according to Specification No. 249,588 (see below) from the arsinic acids or arsenoxides mentioned in (1) above by their reaction with organic compounds containing reactive amido groups, but other than hydrazine or its derivatives; (4) tri- or pentavalent organic arsenic compounds such as halogen-, nitro-, oxy- or amino-aryl arsenoxides, or carboxylated or sulphonated arsinic acids, glycine arsinic acids, etc. A mixture of two different compounds selected from these groups is subjected to reduction with sodium hydrosulphite. If a compound of group (4) is employed, it must always be associated with a compound of the other groups. A large number of examples are given.

249,588. Derivatives of Organic Arseno-compounds, Process for the Production of. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler, 7–9, Weissfrauenstrasse, Frankfurt-on-Main, Germany, and A. Albert, 46, Elisabethstrasse, Munich, Germany. Application date, November 28, 1924. Addition to 199,092 (see The Chemical Age, Vol. IX, p. 68).

These compounds are obtained by the reaction between aromatic aldehydo-arsinic acids or mixed aliphatic aromatic keto-arsinic acids, or the corresponding arsenoxides or arseno compounds, and organic compounds containing reactive amido groups but other than hydrazine or hydrazine derivatives. Such compounds comprise bases of the RNH_2 type, in which R is any substituted or non-substituted aliphatic or aromatic radicle, such as amido-sulphonic acids, amido-carboxylic acids, amido-aldehydes, amido-ketones, acid amides and ureas; or hydroxylamine. Condensation products which contain arsenic in higher stages of oxidation may be treated with reducing agents to obtain arsenoxides or arseno benzols without affecting the C=N double linkage.

249,604. Cracking Process. J. T. Shevlin, 5, Corporation Street, Birmingham. From Universal Oil Products Co., 310, South Michigan Boulevard, Chicago, U.S.A. Application date, December 29, 1924.

This process is an improvement on that described in Specification No. 160,236 (see The Chemical Age, Vol. IV, p. 483). Heavy hydrocarbon oil is subjected to a cracking temperature in a heating coil, and then passed to an expansion chamber. The oil then passes to a dephlegmator, and together with the condensate flows to a cracking furnace to which an independent quantity of charging stock is added at the same time. The pressure on the oil in the dephlegmator may be reduced below the pressure on the oil in the passage way for cracking, and in the conversion chamber, but is maintained above atmospheric pressure. The dephlegmators are provided with transverse baffles to provide tortuous paths for the vapours, and the fresh charging stock is introduced into the dephlegmators.

249,710. Carbonising Apparatus. O. H. Hertel, c/o Old Ben Coal Co., 1845, Illinois Merchants Bank Building, Chicago, U.S.A. Application date, June 15, 1925.

This apparatus is of the kind in which an externally heated retort is provided with an internal hollow member such as a conveying rotor which is heated internally at different points. The internal heating is effected by a number of separately controlled burners spaced along the axis. The external heating is effected by flues in the setting, and is controlled with the internal heating to equalise the temperature in the different zones. The internal burners are movable longitudinally as a unit, and a refractory ring is arranged between the burner and the wall of the hollow member to prevent direct action of the flame.

249,717. ω-Amino Alkyl Amino-Naphthalene Compounds and Substitution Products thereof, Process for the Manufacture of. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. Application date, June 29, 1925.

These products are made by treating a naphthol carboxylic acid containing the hydroxyl and carboxylic groups in the ortho position to each other with an aliphatic diamine in the presence of a sulphite. In an example 2-naphthol 3-carboxylic acid is dissolved in hot water and alkali, and ethylene-diamine hydrate and sodium bisulphite solution then added. The mixture is heated to 90°–100° C. until carbon dioxide ceases to be evolved. A light yellow crystalline precipitate separates, which is filtered and washed with salt solution and with water. Any β-naphthol which is present is removed by adding hot water and caustic soda solution, filtering, and washing with water. The residue is dissolved in water containing hydrochloric acid, and the hydrochloride of ω-amino-ethyl-2-aminonaphthalene is precipitated by concentrated hydrochloric acid. Other examples are given of the production of ω-aminobutyl-2-aminonaphthalene, and ω-amino-ethyl-aminoethyl-2-aminonaphthalene.

249,647. Colloidal or Semi-Colloidal Substances, Precipitates or Sediments, Manufacture of.—And Separation and Recovery of the Solid or Liquid Components. Spencer Chapman and Messel, Ltd., 36, Mark Lane, London, E.C.3, and J. B. Liebert, 4, Overbury Avenue, Beckenham, Kent. Application date, February 19, 1925.

Specification No. 236,087 (see The Chemical Age, Vol. XIII, p. 133) describes a method for clarifying muddy solutions of the mixed sulphates of iron and titanium employed in the manufacture of titanium oxide, by adding substances such as glue or gelatine to coagulate the suspended particles. In this invention, there is also added to the muddy solution together with the glue or gelatine a light inert substance which has a relatively large contact surface, such as powdered asbestos waste or sawdust. The mixture is allowed to stand for a few minutes, and is filtered, yielding a clear solution. The process is also applicable to solutions of thorium or zirconium salts.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—237,571 (A. Ramen), relating to treatment of ores, etc., with liquids, see Vol. XIII, p. 334; 237,594 (Akt.-Ges. für Anilin Fabrikation), relating to manufacture of ortho oxyazo dyestuffs, see Vol. XIII, p. 358.

International Specifications not yet Accepted

247,932. Methyl Alcohols and Hydrocarbons. G. Patart, 50, Rue Spontini, Paris. International Convention date, February 23, 1925.

A mixture of water gas and coal or other distillation gases is passed over a catalyst which would form methyl alcohol from carbon monoxide and hydrogen, and in this case, liquid hydrocarbons are produced in addition. A pressure of 150-250 atmospheres or more, and temperature of 300° C. may be employed, the catalyst being zinc oxide and chromium oxide, prepared by reducing agglomerated basic zinc chromate. The product is condensed and diluted with water, when it separates into two layers, hydrocarbons above, and diluted

methanol below. The undiluted product may be used as a fuel. The residual gas may be partly burnt to produce a mixture of carbon monoxide and hydrogen for use in the process. The process may be operated with fuel distillation gases only.

247,940. SULPHONIC ACIDS. P. I. Schestakoff, 16, Rue Boissonade, Paris. International Convention date, February 17, 1925.

Mineral oils are treated with sulphuric acid, with or without sulphuric anhydride, and the sulphonated oil separated. This is treated with acetic acid or its ester with methyl alcohol or glycerine, to obtain sulphonic acids. The sulphonated oil may be treated with water or aqueous alkali solutions to obtain a solution of the sulphonic acids or sulphonates, before treating with acetic acid.

247,956-7. SYNTHETIC RESINS. Bakelite Ges., 43, Hardenbergstrasse, Charlottenburg, Berlin. International Convention date, February 17, 1925.

247,956. Phenol-aldehyde condensation products are dissolved, with or without an organic solvent, in sufficient alkali to neutralise free phenols but not sufficient to form the resinate. The condensation product is precipitated with water, or with an aqueous solution of a hydrotropic salt such as sodium salicylate or a soap, such as the alkali soaps of the liquid and solid fatty acids, the resinic acids, and the wax acids. Some of the hydrotropic salt may be used in preparing the resin solutions before precipitation. Thus, the resin can be dissolved in alcohol, treated with soap and caustic soda, and then precipitated by adding a more dilute soap solution.

247,957. Phenol-aldehyde compositions containing fillers are made by dissolving the condensation product in alkali or salt solutions with or without organic solvents, impregnating the filling material with the solution, and then precipitating the condensation product by acids in the presence of hydrotropic salts, or by salts without acids, or by water.

247,986. COMPLEX ANTIMONY COMPOUNDS. I. G Farbenindustrie Akt.-Ges., Frankfurt-on-Main, Germany. Assignees of Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, February 19, 1925.

A complex antimony compound of thioglycollic acid is obtained by treating the acid with a compound of pentavalent antimony. The product is allowed to crystallise, or neutralised and then acidified. Two series of salts are obtainable.

LATEST NOTIFICATIONS.

250,890. Process for converting mercury into another element. Siemens and Halske Akt.-Ges. April 18, 1925.

250,892. Production of alkyl resorcinols. Sharp and Dohme. April 16, 1925.

250,893. Production of acyl resorcinols. Sharp and Dohme. April 16, 1925.

250,897. Methods of producing amines, the substitution products thereof, nitriles, and tetrazoles. Knoll and Co. and Schmidt, K. F. April 14, 1925.

250,909. Process for the production of azo-dyestuffs and lakes insoluble in water. I. G. Farbenindustrie Akt.-Ges. April 18, 1925.

250,910. Process for the production of new ester mixtures. Claasen, Dr. W. April 14, 1925.

250,948. Manufacture and production of organic compounds from natural oils, bitumens, and the like. I. G. Farbenindustrie Akt.-Ges. April 15, 1925.

250,955. Manufacture of aromatic aldehydes. I. G. Farbenindustrie Akt.-Ges. April 15, 1925.

250,956. Manufacture of a non-hygroscopic pulverulent product from cellulose waste liquor. I. G. Farbenindustrie Akt.-Ges. April 15, 1925.

250,968. Manufacture of derivatives of the anthraquinone series. I. G. Farbenindustrie Akt.-Ges. April 17, 1925.

250,990. Simultaneous manufacture of sulphates and of sulphur. Harnist, C. April 20, 1925.

Specifications Accepted with Date of Application

226,836. Rubber vulcanisation. Dovan Chemical Corporation. December 29, 1923.

227,435. Producing metals or metal alloys low in carbon directly out of ore or the like. H. G. Flodin and E. G. T. Gustafsson. January 12, 1924.

227,475. Producing methyl alcohol and methylene chloride from methane, Process of. T. Goldschmidt Akt.-Ges. January 10, 1924.

230,861. Artificial resins, Production of. C. Kulas and J. Scheiber. March 17, 1924.

235,877. Intermediate products of the anthracene series, Manufacture of—and of dyestuffs therefrom. Soc. of Chemical Industry in Basle. June 21, 1924. Addition to 210,413.

237,590. Compounds of dialkyl or aryl alkyl barbituric acids, Manufacture of. F. Hoffmann La Roche and Co. Akt.-Ges. July 23, 1924.

242,259. Evaporating process and apparatus therefor. Soc. Générale d'Evaporation Procédés Prache and Bouillon. October 31, 1924.

245,430. Phosphoric acid anhydride, Process for the production of. Chemische Fabrik Griesheim-Elektron. December 30, 1924.

250,287. Heterocyclical compounds containing arsenic or antimony, Process for the production of. A. Binz and C. Rath. October 30, 1924.

250,289. Water gas from liquid hydrocarbons. M. Brutzkus. November 10, 1924.

250,398. Tanning substances, Manufacture of. Farbwerke vorm. Meister, Lucius, and Brüning, G. Kranzlein, A. Voss, and H. Gartner. April 24, 1925. Addition to 211,145.

250,453. Addition compounds of hydrocyanic acid and metal chlorides, Process for the production of. H. Stoltzenberg. August 15, 1925.

Applications for Patents

Bleachers' Association, Ltd., Kershaw, W., and Parker, C. S. Treatment of cellulosic materials. 10,688, 10,689, 10,690, 10,691. April 23.

Bleachers' Association, Ltd., Kershaw, W., and Parker, C. S. Treatment of cellulosic materials. 10,807, 10,808. April 24.

Canada Carbide Co., Ltd., and Potts, H. E. Dissociation of carbonaceous gases, etc. 10,809. April 24.

Carpmael, W., and I. G. Farbenindustrie Akt.-Ges. Anthraquinone derivatives. 10,281. April 19.

Carpmael, W., and I. G. Farbenindustrie Akt.-Ges. Reduction of aromatic nitro compounds. 10,559, 10,570. April 21.

Carpmael, W., and I. G. Farbenindustrie Akt.-Ges. Manufacture of anthraquinone derivatives. 10,560. April 21.

Dehn, F. B., and Pinick and Ford. Manufacture of starch. 10,236. April 19.

Drescher, H. A. E., Harris, J. E. G., Scottish Dyes, Ltd., Thomas, J., and Wylam, B. Dyes and dyeing. 10,632. April 22.

Drescher, H. A. E., Harris, J. E. G., Scottish Dyes, Ltd., Thomas, J., and Wylam, B. Dyes and dyeing. 10,739. April 23.

Everest, A. E., and Wallwork, J. A. Vat dyes. 10,241. April 19.

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of dyestuffs. 10,780. April 23. (Germany, April 9, 1924.)

Hands, H. J. Compositions containing cellulose esters and ethers, etc. 10,485. April 21.

Harnist, C. Production of sulphates and sulphur. 10,451. April 20. (United States, April 20, 1925.)

Humphrey, H. A. Manufacture of titanium oxide. 10,647. April 22.

I. G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of pigment colours. 10,520. April 21.

I. G. Farbenindustrie Akt.-Ges. Manufacture of cyclic hydrocarbons. 10,265. April 19. (Germany, April 24, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of water-soluble condensation products. 10,781. April 23. (Germany, April 23, 1925.)

Macallum, A. D. Manufacture of diacetyl-3:3′-diamino-4:4′-dihydroxy-5:5′-diiodoarsenobenzene, etc. 10,358. April 20.

Metallbank und Metallurgische Ges. Akt.-Ges. Production of lithium carbonate. 10,770. April 23. (Germany, May 29, 1925.)

Minerals Separation, Ltd. (Minerals Separation, Ltd.). Separation of precious metals from antimonial ores. 10,580. April 22.

Naugatuck Chemical Co. Manufacture of waterproofing compositions. 10,530. April 21. (United States, May 7, 1925.)

Scottish Dyes, Ltd., Thomas, J., and Thomson, R. F. Manufacture of dyestuffs, etc. 10,633. April 22.

New Uses for Potassium Permanganate

THE Carus Chemical Co., U.S.A., recently organised a contest for new uses of potassium permanganate. The first award was made to a Seattle man for the invention and commercial production of a waterproof glue made from soya bean oil and permanganate. The new product is understood to have valuable industrial applications. Another suggested use was for the treatment of seed potatoes with 5 per cent. permanganate solution against fungus. Corrosive sublimate is now largely used, but its poisonous properties are a disadvantage. Potassium permanganate, after experiment, was also suggested as a means of preventing the growth of mosquito larvæ.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystal, £23 per ton. Powder, £24 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3½d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—3d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4½d. to 5d. per lb. Crude 60's, 1s. 5d. to 1s. 6d.

ACID CRESYLIC 97/99.—1s. 8d. to 1s. 9d. per gall. Pale, 95%, 1s. 6d. to 1s. 8d. per gall. Dark, 1s. 3d. to 1s. 6d. per gall. Steady.

ANTHRACENE.—A quality, 3d. to 4d. per unit.

ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.

BENZOL.—Crude 65's, 1s. 1d. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 8½d. to 1s. 11d. per gall., ex works in tank wagons. Pure, 1s. 10d. to 2s. 3d. per gall., ex works in tank wagons.

TOLUOL.—90%, 1s. 8d. to 2s. 1d. per gall. Pure, 1s. 11d. to 2s. 3d. per gall.

XYLOL.—2s. to 2s. 6d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. to 10d. per gall. Standard specification, middle oil, heavy, 6½d. to 7½d. per gall.

NAPHTHA.—Crude, 9d. to 1s. 2d. per gall. according to quality. Solvent 90/160, 1s. 5d. to 2s. per gall. Steady demand. Solvent 90/190, 1s. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £5 per ton. Whizzed or hot pressed, £5 to £7 10s.

NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.

PITCH.—Medium soft, 72s. 6d. to 87s. 6d. per ton, according to district. Lower prices on West Coast.

PYRIDINE.—90/140, 18s. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—7s. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—8s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ANILINE OIL.—7d. per lb. naked at works.

ANILINE SALTS.—7d. to 7½d. per lb. naked at works.

BENZALDEHYDE.—2s. 1d. per lb. Fair home inquiry.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

o-CRESOL 29/31° C.—3d. to 3½d. per lb. Demand quiet.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLANILINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.

B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.

B-NAPHTHYLAMINE.—3s. 2d. per lb. d/d. Fair home inquiry.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. 3d. per lb. d/d.

p-NITRANILINE.—1s. 9d. per lb. d/d. Fair home inquiry.

NITROBENZENE.—5d. per lb. naked at works. Fair home inquiry.

NITRONAPHTHALENE.—10d. per lb. d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9. Firmer. Grey, £17 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.

ACETONE.—£81 per ton.

CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand good.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.

RED LIQUOR.—9½d. to 1s. per gall.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

WOOD TAR.—£3 to £5 per ton, according to grade.

BROWN SUGAR OF LEAD.—£40 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£46 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5½d. to 6½d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—5s. 3d. per lb.

ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic, 80% B.P.—£39 per ton ex wharf London in glass containers.

Acid, Acetyl Salicylic.—2s. 4d. to 2s. 5d. per lb. Keen competition met. Good demand.

Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.

Acid, Boric B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

Acid, Camphoric.—19s. to 21s. per lb.

Acid, Citric.—1s. 4d. to 1s. 4½d. per lb., less 5%.

Acid, Gallic.—2s. 8d. per lb. for pure crystal, in cwt. lots.

Acid, Pyrogallic, Crystals.—6s. 7d. per lb. Resublimed, 7s. 3d.

Acid, Salicylic.—1s. 3½d. to 1s. 4½d. per lb. Technical.—10¾d. per lb.

Acid, Tannic B.P.—2s. 10d. per lb.

Acid, Tartaric.—1s. 0½d. per lb., less 5%. Market firm.

Amidol.—6s. 6d. per lb., d/d.

Acetanilide.—1s. 7d. to 1s. 8d. per lb. for quantities.

Amidopyrin.—12s. 6d. per lb.

Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.

Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

Atropine Sulphate.—11s. per oz. for English make.

Barbitone.—10s. per lb.

Benzonaphthol.—3s. 3d. per lb. spot.

Bismuth Carbonate.—12s. 6d. to 14s. 3d. per lb.

Bismuth Citrate.—9s. 6d. to 11s. 3d. per lb.

Bismuth Salicylate.—10s. 3d. to 12s. per lb.

Bismuth Subnitrate.—10s. 9d. to 12s. 6d. per lb. according to quantity.

Borax B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

Bromides.—Potassium, 1s. 8½d. to 1s. 11d. per lb.; sodium, 1s. 11d. to 2s. 2d. per lb.; ammonium, 2s. 2d. to 2s. 5d. per lb., all spot.

Calcium Lactate.—1s. 2½d. to 1s. 3½d.

Chloral Hydrate.—3s. 3d. to 3s. 6d. per lb., duty paid.

Chloroform.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

Creosote Carbonate.—6s. per lb.

Formaldehyde.—£40 per ton, in barrels ex wharf.

Guaiacol Carbonate.—7s. 6d. per lb.

Hexamine.—2s. 4d. to 2s. 6d. per lb.

Homatropine Hydrobromide.—30s. per oz.

Hydrastine Hydrochloride.—English make offered at 120s. per oz.

Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.

Hydroquinone.—4s. 3d. per lb., in cwt. lots.

Hypophosphites.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

Iron Ammonium Citrate B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

Magnesium Carbonate.—Light Commercial, £31 per ton net.

Magnesium Oxide.—Light Commercial, £67 10s. per ton, less 2½%, price reduced; Heavy Commercial, £22 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

Menthol.—A.B.R. recrystallised B.P., 20s. net per lb., Synthetic, 12s. 6d. to 15s. per lb., according to quality; English make, price reduced.

Mercurials.—Red oxide, 5s. 8d. to 5s. 10d. per lb.; Corrosive sublimate, 4s. to 4s. 2d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. 3d. to 4s. 5d. per lb.

Methyl Salicylate.—1s. 7d. per lb.

Methyl Sulphonal.—16s. 6d. per lb.

Metol.—9s. per lb. British make.

Paraformaldehyde.—1s. 11d. for 100% powder.

Paraldehyde.—1s. 4d. per lb.

Phenacetin.—4s. to 4s. 3d. per lb.

Phenazone.—6s. to 6s. 3d. per lb.

Phenolphthalein.—4s. to 4s. 3d. per lb.

Potassium Bitartrate 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots.

Potassium Citrate.—1s. 11d. to 2s. 2d. per lb.

Potassium Ferricyanide.—1s. 9d. per lb. in cwt. lots. Quiet.

Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity.

Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

Potassium Permanganate.—B.P. crystals, 6¾d. per lb., spot, slightly easier.

Quinine Sulphate.—1s. 8d. to 1s. 9d. per oz., in 100 oz. tins. Price heavily reduced.

Resorcin.—4s. to 5s. per lb., spot.

Saccharin.—55s. per lb. Better demand.

Salol.—3s. per lb.

Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.

Sodium Citrate, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923. 1s. 11d. to 2s. 2d. per lb., according to quantity.

Sodium Ferrocyanide.—4d. per lb. carriage paid.

Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.

Sodium Nitroprusside.—16s. per lb.

Sodium Potassium Tartrate (Rochelle Salt).—75s. to 80s. per cwt., according to quantity.

Sodium Salicylate.—Powder, 1s. 9d. to 1s. 10d. per lb. Crystal, 1s. 10d. to 1s. 11d. per lb. Good demand.

Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.

Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

Sulphonal.—11s. 6d. per lb. Limited demand.

Tartar Emetic, B.P.—Crystal or Powder, 1s. 10d. to 1s. 11d. per lb.

Thymol.—11s. 6d. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

Acetophenone.—9s. per lb.

Aubepine (ex Anethol).—9s. 6d. per lb.

Amyl Acetate.—3s. per lb.

Amyl Butyrate.—6s. 6d. per lb.

Amyl Salicylate.—3s. 3d. per lb.

Anethol (M.P. 21/22° C.).—5s. 6d. per lb.

Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 3d. per lb.

Benzyl Alcohol free from Chlorine.—2s. 3d. per lb.

Benzaldehyde free from Chlorine.—2s. 6d. per lb.

Benzyl Benzoate.—2s. 9d. per lb.

Cinnamic Aldehyde Natural.—17s. 6d. per lb.

Coumarin.—11s. 9d. per lb.

Citronellol.—15s. per lb.

Citral.—9s. per lb.

Ethyl Cinnamate.—9s. per lb.

Ethyl Phthalate.—3s. per lb.

Eugenol.—9s. 6d. per lb.

Geraniol (Palmarosa).—10s. 3d. per lb.

Geraniol.—7s. to 16s. per lb.

Heliotropine.—6s. per lb.

Iso Eugenol.—14s. per lb.

Linalol ex Bois de Rose.—17s. 6d. per lb.

Linalyl Acetate.—18s. per lb.

Methyl Anthranilate.—9s. 3d. per lb.

Methyl Benzoate.—5s. per lb.

Musk Ketone.—34s. 6d. per lb.

Musk Xylol.—8s. per lb.

Nerolin.—4s. per lb.

Phenyl Ethyl Acetate.—12s. per lb.

Phenyl Ethyl Alcohol.—9s. 6d. per lb.

Rhodinol.—27s. 6d. per lb.

Safrol.—1s. 8d. per lb.

Terpineol.—1s. 6d. per lb.

Vanillin.—21s. 6d. to 23s. per lb. Good demand.

Essential Oils

Almond Oil.—12s. 6d. per lb.

Anise Oil.—3s. 2d. per lb.

Bergamot Oil.—31s. 6d. per lb.

Bourbon Geranium Oil.—11s. 3d. per lb.

Camphor Oil.—60s. per cwt

Cinnamon Oil, Leaf.—5d. per oz.

Cassia Oil, 80/85%.—9s. 6d. per lb.

Citronella Oil.—Java, 85/90%, 3s. Ceylon, 2s. per lb.

Clove Oil.—6s. 9d. per lb.

Eucalyptus Oil, 70/75%.—1s. 10d. per lb.

Lavender Oil.—French 38/40%, Esters, 21s. 6d. per lb.

Lemon Oil.—9s. per lb.

Lemongrass Oil.—4s. 9d. per lb.

Orange Oil, Sweet.—11s. 9d. per lb.

Otto of Rose Oil.—Bulgarian, 65s. per oz. Anatolian, 40s. per oz.

Palma Rosa Oil.—12s. per lb.

Peppermint Oil.—Wayne County, 70s. per lb. Japanese, 12s. per lb.

Petitgrain Oil.—9s. per lb.

Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 17s. 3d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 29, 1926.

BUSINESS this week has again been rather quiet and with few exceptions transactions have been restricted to buyers' immediate requirements. There is great anxiety on all sides owing to the industrial difficulties and there is no doubt that the coal dispute has retarded that development of trade which had been so confidently expected. On the whole prices are firm, due in the majority of cases to the fact that values have receded to such an extent as to render further reductions in price most unpleasant to makers. With any improvement in trade a distinct upward trend of values is to be expected. Export demand is rather better—a moderate business is passing.

General Chemicals

ACETONE.—The market is very quiet, price remains firm from £81 to £82 per ton.

ACID ACETIC is in better demand, prices unchanged at £37 per ton for technical 80% in quantity, with the usual difference for other grades.

ACID FORMIC has declined in price and is quoted at £48 10s. per ton for 85%.

ACID LACTIC is unchanged and in fair demand at £43 10s. per ton for 50% by weight.

ACID OXALIC has been in better inquiry although the demand is still abnormally low. Price is particularly firm at 3¾d. per lb. with an upward tendency.

ACID TARTARIC is firm and in fair demand, at about 11½d. per lb.

ALUMINA SULPHATE is quieter, as is to be expected at this time of the year. Price unchanged at £5 15s. per ton.

AMMONIA CHLORIDE is very weak and is generally quoted at £18 per ton.

ARSENIC remains lifeless; price is nominally £14 per ton which can be shaded for genuine business.

BARIUM CHLORIDE is in fair demand at about £10 to £11 per ton, according to quantity and position.

EPSOM SALTS is unchanged and firm at £5 15s. per ton.

FORMALDEHYDE is rather firmer and is quoted at £41 10s. to £43 per ton.

IRON SULPHATE is unchanged.

LEAD ACETATE has been a more active market at £45 to £46 per ton for white, brown at £2 per ton less.

METHYL ALCOHOL is in fair demand at £44 to £45 per ton.

METHYL ACETONE is firm and scarce at about £57 per ton.

POTASSIUM CARBONATE AND CAUSTIC.—Demand is not very satisfactory and price is easy.

POTASSIUM CHLORATE is quietly steady at about 3¾d. per lb.

POTASSIUM PERMANGANATE is in fair demand at 6d. to 7d. per lb., according to quality.

POTASSIUM PRUSSIATE is firm and in fair demand at 7d. per lb.

SODA ACETATE is very scarce and is quoted at £21 to £22 per ton.

SODA BICHROMATE is quiet and British makers' price is unchanged at 3½d. per lb.

SODA CHLORATE demand is quiet, but supplies are not excessive. Price is 3¾d. per lb.

SODA NITRITE has been in fair demand at about £21 per ton.

SODA PHOSPHATE is quietly steady at £13 10s. to £14 10s. per ton.

SODA PRUSSIATE has been in much better demand at a price of 4d. per lb.

SODA SULPHIDE is unchanged.

SODA SULPHATE is unchanged.

Coal Tar Products

Conditions are slightly upset by the uncertainty as to whether or no a coal strike will take place at the end of the week, and business is consequently somewhat quiet. Prices, however, remain unchanged from last week.

90's BENZOL is unchanged, at 1s. 9½d. per gallon on rails.

PURE BENZOL is quoted at 2s. 1d. to 2s. 2d. per gallon on rails.

CREOSOTE OIL is steady, at 5¾d. to 6d. per gallon on rails in the North, while the price in London is 6¾d. to 7d. per gallon.

CRESYLIC ACID is unchanged from last week, and is quoted at 1s. 9d. to 1s. 10d. per gallon on rails for the pale quality 97/99% for export, while the dark quality 95/97%, also for export, is quoted at 1s. 7d. to 1s. 8d. per gallon on rails. The ordinary pale quality 97/99% for the home trade is worth about 1s. 6d. per gallon on rails, while the dark quality 95/97% is quoted at 1s. 4d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. 5d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENES are unchanged, the lower grades being worth from £3 10s. to £4 5s. per ton, 76/78 quality about £6 per ton, and 74/76 quality about £5 to £5 10s. per ton.

PITCH.—Very little business is being reported, the market is quiet. Prices are unchanged at 80s. to 82s. 6d. per ton f.o.b. U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL was steady and occasionally 2s. 6d. decline. Spot, £30 15s., ex mill; April and May, £29 17s. 6d.; May-Aug., £30; Sept.-Dec., £30 7s. 6d. RAPE OIL was firm. Crude extracted, spot, £48 10s.; technical refined, £50 10s. COTTON OIL steady. Refined common edible, £42; Egyptian crude, £36; deodorised, £44. TURPENTINE easy at 1s. to 6d. per cwt, decline. American, spot, 60s. 6d.; May-June, 60s. 3d.; and July-Dec., 58s. 6d.

HULL.—LINSEED OIL.—Naked, spot, and April, £30 2s. 6d.; May-Aug., £30 5s.; Sept.-Dec., £30 12s. 6d. COTTON OIL.—Naked Bombay crude, £35; Egyptian crude, £35 15s.; edible refined, £39 10s.; technical, £38 10s. PALM KERNEL OIL.—Crushed naked, 5½ per cent., £42 10s. GROUNDNUT OIL.—Crushed-extracted, £44 15s.; deodorised, £48 15s. SOYA OIL.—Extracted and crushed, £36; deodorised, £40; RAPE OIL.—Crude extracted, £47 10s.; refined, £49 10s. per ton, net cash terms ex mill. CASTOR OIL and COD OIL unchanged.

Nitrogen Products Market

Export.—As the home season is coming to a close, there is more sulphate of ammonia available for shipment from British ports, and British producers are quoting on the basis of £12 5s. per ton f.o.b. in single bags for first half May with slightly lower prices for second half May. Continental producers are quoting similar prices. The demand still continues from continental countries as well as from the Far East and the West Indies.

Home.—There is considerable evidence now to show that the home season which commenced earlier this year is coming to a close. In the South of England, merchants are placing only occasional orders. The demand from Scotland and Ireland is still, however, maintained strongly. There seems no doubt that the consumption this year will show a big increase on that of last year. The present home prices remain in force until May 31, when it is expected that the usual reductions will take place.

Nitrate of Soda.—The nitrate market remains unchanged. Stocks in Europe and Egypt are being steadily liquidated. American consumption continues to be satisfactory. Cargoes c.i.f. chief European ports are changing hands at about £11 12s. per ton for prompt arrival. It seems clear that there will be considerable stocks of nitrate carried over into the new season. No doubt producers will write these down to the new price level when it is announced.

Calcium Cyanamide

As the spring season is now drawing to a close, the market is quieter, but considerable interest is being taken in cyanamide for use in the destruction of charlock. Reports from European countries state that there is still a good demand and the market activity for cyanamide this season has continued several weeks later than is usual. Calcium cyanamide contains 19 per cent. nitrogen and about 60 per cent. lime. The price to farmers for May delivery is £10 6s. per ton for 4 ton lots, carriage paid to any railway station in Great Britain.

Potash Fertilisers

THE demand for potash fertilisers continues to be brisk and the season's business might be said to be in full swing. Farmers were particularly late this season in ordering fertilisers, with the result that fertiliser manufacturers and merchants have had to deal with a rush of business and experienced difficulty in coping with the demand during the last six weeks or so.

There has been an unusually good demand for the concentrated potash fertilisers, sulphate of potash and muriate of potash, and, although late in the season, there has also been a wonderfully good demand for kainit as well as the 20 per cent. and 30 per cent. salts. The specific propaganda drawing attention to balanced fertilisers for potatoes and larger dressings per acre accounts, to a large extent, for the increasing demand for the concentrated potash salts. The development of sugar beet growing, for which potash is admittedly important, also affords a fresh outlet for the use of potash fertilisers.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 29, 1926.

THERE is no improvement in the position of the Chemical Market and there is now not much chance of improvement until the end of the month when the dispute in the coal industry will be settled one way or the other. There are no important changes in prices to record.

Industrial Chemicals

ACID ACETIC.—98/100% quoted £55 to £67 per ton, according to quantity and packing, c.i.f. U.K. port. 80% pure, £40 to £41 per ton; 80% technical, £38 to £39 per ton, packed in casks c.i.f. U.K. ports.

ACID BORIC.—Crystal, Granulated, or small flakes, £37 per ton; powdered, £39 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—In little demand, quoted 4¾d. per lb. delivered or f.o.b. U.K. ports but with firm business in hand this price could probably be shaded.

ACID CITRIC, B.P. CRYSTALS.—Now quoted 1s. 3d. per lb., less 5% ex wharf. The same price named for material to come forward.

ACID FORMIC, 85%.—Quoted about £50 per ton ex wharf early delivery. Offered from the continent at £49 per ton c.i.f. U.K. ports.

ACID HYDROCHLORIC.—In little demand; price 6s. 6d. per carboy ex works.

ACID NITRIC, 80°.—Remains unchanged at £23 5s. per ton ex station, full truck loads.

ACID OXALIC, 98/100%.—Spot material available at about 3⅞d. per lb. ex store. Quoted 3½d. per lb. c.i.f. U.K. ports duty paid, to come forward.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In little demand and quoted price unchanged at about 11¼d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—On offer from the continent at about £5 8s. 6d. per ton c.i.f. U.K. ports. Spot material quoted £6 5s. per ton ex store.

ALUM LUMP POTASH.—Unchanged at about £7 12s. 6d. per ton c.i.f. U.K. ports. Spot material quoted £9 per ton ex store; powdered quality 5s. per ton less; powdered quality offered from the continent at about £7 7s. 6d. per ton c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Imported material selling at about 11¼d. to 11½d. per lb. ex wharf containers extra and returnable.

AMMONIA CARBONATE.—Lump £37 per ton; powdered £39 per ton, packed in 5 cwt. casks delivered or f.o.b. U.K. ports.

AMMONIA LIQUID 880°.—Unchanged at about 2½d. to 3d. per lb. delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £23 10s. to £25 10s. per ton ex station. Continental on offer at about £21 10s. per ton c.i.f. U.K. ports. Fine white crystals of continental manufacture quoted £18 5s. per ton c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED CORNISH.—Spot material available at £16 15s. per ton ex store. On offer for early delivery at about £16 per ton ex wharf.

BARIUM CHLORIDE 98/100%.—Fine white crystals quoted £8 15s. per ton c.i.f. U.K. ports, prompt shipment from the Continent. Spot material available at about £10 15s. per ton ex store.

BLEACHING POWDER.—English material unchanged at £9 10s. per ton ex station; contracts 20s. per ton less. Continental on offer at about £7 12s. 6d. per ton c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton ex works; continental quoted £5 per ton c.i.f. U.K. ports.

BORAX.—Granulated, £22 10s. per ton; crystals, £23 per ton; powdered £24 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturer's price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton ex station. Continental rather cheaper at £4 5s. per ton c.i.f. U.K. ports.

COPPERAS, GREEN.—In moderate demand for export quoted £3 17s. 6d. per ton c.i.f. U.K. ports. On offer for home consumption at about £3 10s. per ton f.o.r. works.

COPPER SULPHATE 99/100%.—Good inquiry for export and price for British material unchanged at £23 10s. per ton f.o.b. U.K. ports. Continental on offer at about £21 10s. per ton ex wharf.

FORMALDEHYDE 40%.—Unchanged at about £37 per ton c.i.f. U.K. ports, prompt shipment. Spot material available at about £38 per ton ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton ex store or station. Continental on offer at about £3 5s. per ton c.i.f. U.K. ports.

LEAD, RED.—Imported material quoted £38 per ton ex store.

LEAD, WHITE.—Quoted £37 per ton c.i.f. U.K. ports. Spot material available at about £38 15s. per ton ex store.

LEAD ACETATE.—White crystals on offer from the Continent at about £44 15s. per ton c.i.f. U.K. ports. Brown about £39 10s. per ton c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton ex store in moderate demand.

POTASH CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton c.i.f. U.K. ports according to quantity and destination. Spot material available at about £29 per ton ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE.—96/98% quoted £25 5s. per ton ex wharf, early delivery. Spot material on offer at £26 10s. per ton ex store. 90/94% quality quoted £22 5s. per ton c.i.f. U.K. ports.

POTASSIUM CHLORATE, 98/100% POWDERED.—Offered from the continent at about £27 10s. per ton c.i.f. U.K. ports.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 5s. per ton c.i.f. U.K. port, prompt shipment. Spot material available at about £25 per ton ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 7½d. per lb. ex store, spot delivery. To come forward 7d. per lb. ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Quoted 7½d. per lb. ex store spot delivery. Offered from the continent at 7¼d. per lb. ex wharf.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken 60%, £16 12s. 6d. per ton; powdered 98/99%, £20 17s. 6d. per ton, all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material scarce, but limited supplies available at £20 10s. per ton ex store. Quoted £19 15s. per ton c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton ex quay or station; powdered or pea quality, £7 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton ex station, minimum 4-ton lots; pea crystals, £4 10s. per ton ex station. Continental commercial quality on offer at about £8 5s. per ton c.i.f. U.K. ports.

SODIUM NITRATE.—Quoted £13 per ton ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Quoted £24 per ton ex store. Offered from the continent at about £22 5s. per ton c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Spot material now on offer at 4¼d. per lb. ex store. Quoted 4d. per lb. ex wharf early shipment from the continent.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE, 60/62%.—Solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton, all delivered buyers' works U.K. minimum 5-ton lots with slight reduction for contracts. 60/62% solid quality offered from the continent at about £9 15s. per ton c.i.f. U.K. ports; broken, 15s. per ton more; crystals, 30/32%, £7 per ton c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 10s. per ton; roll, £10 5s. per ton; rock, £10 5s. per ton; ground, £9 15s. per ton, ex store, spot delivery; prices nominal.

ZINC CHLORIDE.—British material 96/98% quoted £23 15s. per ton f.o.b. U.K. port; 98/100 % solid on offer from the continent at about £21 15s. per ton c.i.f. U.K. ports; powdered, 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BENZALDEHYDE.—2s. 1½d. per lb. Some home inquiries.
BETA NAPHTHOL.—11d. to 1s. per lb. Fair home inquiries.
PARANITRANILINE.—1s. 9d. per lb. Some home inquiries.
ALPHA NAPHTHOL.—2s. per lb. Small home inquiries.
NAPHTHIONATE OF SODA.—1s. 8d. per lb. Fair home inquiries.
DIMETHYLANILINE.—1s. 11d. per lb. Some home inquiries.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, April 29, 1926.

With the outcome of the coal dispute uncertain to the last the Manchester chemical market has been dull in most sections. Little important business has been put through this week and for what offered there was very keen competition among sellers. For the most part the current demand is for relatively small lots and principally for prompt or early delivery. On the export side inquiry is rather slow and what there is is largely from the Dominions and the East. Whilst the market generally keeps fairly steady all round as regards prices, it is possible here and there to discover weakness.

Heavy Chemicals

Phosphate of soda is not very active but quotations are steady and now range from £12 15s. to £13 per ton. Glauber salts are slow but unchanged at round £3 5s. and saltcake at £3 per ton is in much the same position. There is a quietly steady call for caustic soda both for home use and for shipment, and prices are firm at from £15 2s. 6d. per ton for 60 per cent. to £17 10s. for 76 per cent. Sulphide of sodium is weak and the demand for this continues on a restricted scale; commercial crystals are at £9 15s. per ton and 60-65 per cent. concentrated solid at £10 15s. Hyposulphite of soda is quiet at £14 5s. to £14 10s. per ton for photographic and £9 5s. for commercial. Bichromate of soda is still in rather limited demand but prices remain at about 3¼d. per lb. Bleaching powder is in quiet request and quotations are steady at £8 10s. per ton. For acetate of soda inquiry has been slow during the week at about £20 per ton. Alkali is well held at £6 15s. per ton and a moderate amount of business is being done. Chlorate of soda continues to meet with a fair demand and at 3½d. per lb. there is little change to be reported. There has been little improvement in the volume of the inquiry for bicarbonate of soda but quotations remain at round £10 10s. per ton.

Permanganate of potash continues in quiet demand at 5d. to 5¼d. per lb. for commercial and about 7d. per lb. for pharmaceutical material. Bichromate of potash is rather slow but the price keeps fairly steady at 4¼d. per lb. Yellow prussiate of potash is quoted at about 7d. per lb. but the tendency seems to be easy and the demand is only moderate. For carbonate of potash a fair amount of inquiry has been reported this week and values are round £26 5s. per ton. Caustic potash is on offer at about £27 per ton for 90 per cent. material and shows little alteration, but the demand for this is restricted. Chlorate of potash is maintained at 4d. per lb. and is in quiet request.

Business in arsenic is still on a limited scale but rates are steady at about £14 per ton, on rails, for white powdered, Cornish makes. Sulphate of copper is selling in comparatively small quantities at from £23 15s. to £24 per ton. Acetate of lime seems to be rather less weak than it has been recently but there is no improvement in the demand; grey ranges from £16 5s. to £16 10s. per ton and brown at £7 15s. Acetate of lead is not particularly active but values continue firm, with white on offer at £45 10s. per ton and brown at £41. Nitrate of lead is also quiet but prices are maintained at £40 to £41 per ton. Commercial Epsom salts attract a certain amount of attention at £3 12s. 6d. per ton, with magnesium sulphate, pharmaceutical quality, quoted at about £4 10s. per ton.

Acids and Tar Products

The demand for acetic acid is on a moderate scale and prices are steady at £36 10s. per ton for 80 per cent. commercial and £66 to £67 per ton for glacial. Citric acid is on the easy side at about 1s. 3d. per lb. and inquiry for this is slow. Tartaric acid also is not selling freely but quotations are about unchanged at 11¼d. per lb. Oxalic acid continues in limited request at 3⅝d. to 3⅞d. per lb.

There is little actual business being transacted in pitch at the moment and values are nominal at, say, £3 15s. per ton, f.o.b. Cresylic acid keeps fairly steady at 1s. 9½d. per gallon, but the demand is slow. Carbolic acid continues very dull at 4¾d. per lb. for crystals and 1s. 4½d. per gallon for crude material. Solvent naphtha is quiet at present at about 1s. 6¼d. per gallon. Creosote oil is quite steady and in fair demand at 6½d. to 6¾d. per gallon.

Tariff Changes

Bulgaria.—New import rates include:—Pure copper sulphate, 20 leva (gold) per 100 kilogs.

Czechoslovakia.—Legislation now provides strict regulations for the import of pharmaceutical products. Copies of the order may be inspected at the D.O.T.

France.—A Franco-German agreement provides for the following rates of duty for goods imported from Germany:—Soda (chromate and bichromate), 90 per cent. reduction in respect of 750 quintals; zinc oxide, 90 per cent. reduction; synthetic tanning extracts, 89 per cent. reduction for 750 quintals.

A law increases the Customs duty on precipitated carbonate of baryta to 2 fr. per 100 kilogs. (min. tariff) and 10 fr. per 100 kilogs. (general tariff) with coefficient of 2 in each case.

France.—The following are included in increases in Turnover Tax to be levied in certain instances from April 1 to December 31, 1926:—3·5 per cent. on sales by manufacturers and on the importation of nitrates of soda and lime, cyanamide, sulphate of ammonia, potassium salts K_2O, dephosphorisation slag, superphosphates and oilcakes. Sales of phosphates, bones, and pyrites used for making superphosphates, are exempt from the turnover tax.

Article 52 increases from 3 to 4 the "coefficient of increase" applicable to the Customs duties on lubricating oils, heavy oils, and residues of petroleum and of other mineral oils (except residues known as gas oil, fuel oil, and road oil) and pitch elsewhere provided for in the Tariff, and coke, (ex Tariff No. 198). The effect is to increase the "Minimum" Tariff duty from 27 to 36 frs. per 100 kilogs. net.

Article 53 provides for State control of importation of crude petroleum, its derivatives and residues. Article 49 increases from 24 to 35 frs. (net) per hectolitre the internal tax on refined or illuminating mineral oils, benzols, benzines, toluenes, and pure or mixed coal tar spirit. Article 51 exempts from the above taxes products obtained in French factories from the distillation of tar, mine waste, etc., and this exemption may be extended, during ten years, to factories engaged in certain coal-tar processes.

The salt tax is increased from 10 to 20 frs. per 100 kilogs, and there are certain taxes on pharmaceutical products, ex certain soaps.

Japan.—The full text of the new Tariff is printed in the *Board of Trade Journal* for April 15. The chemical section is extensive.

Roumania.—Export duties now include:—Acetone, 300 lei per wagon; pitch, tar and naphthic acids, 300 lei per kilog.

Turkey.—There is a proposition to withdraw the existing prohibition on the manufacture in Turkey of artificial silk fabrics.

Nitrate Consumption Prospects

It seems fairly certain (*The Times* states) that consumption of nitrate for the current season will show a falling off. The extent of the reduction is, however, still a matter of much uncertainty, and the season must advance further before the position can be accurately gauged. European consumption has been adversely affected by unfavourable climatic conditions and probably to a still greater extent by the recent weakness and instability of the French and Belgian exchanges. The latter influence has prevented French importers from arranging forward transactions and it is a usual experience that an abstention from forward purchases is never fully made good subsequently. Reports of consumption in this country have of late been fairly encouraging, but there is a prospect of a decline in the demands from the United States, the most important individual consumer, though the extent of the stocks in that country is always a matter of considerable doubt. Severe competition from the synthetic commodity continues. On the production side, the nitrate companies have experienced a rise in costs as a result of the recent social legislation enacted by the Chilean Government. The outlook for the industry, therefore, appears less favourable. A special commission in Chile has recommended a reduction of 10s. per ton in the export duty, if producers agree to lower their selling price by 20s. per ton. No indication is at present forthcoming of the Government's intentions on this question.

Company News

AMALGAMATED ZINC (DE BAVAY'S), LTD.—The annual ordinary general meeting will be held in Melbourne on May 6.

INTERNATIONAL NICKEL CO.—A quarterly dividend of 1½ per cent. on the preferred stock has been declared payable on May 1.

RAY CONSOLIDATED COPPER CO.—For the year 1925 the net revenue was 4,634,348 dol., but there was no distribution to the stockholders.

NEVADA CONSOLIDATED COPPER CO.—The receipts for 1925 were 3,368,258 dol., and the net revenue was 2,696,807 dol. A dividend of 25 cents per share was paid.

LIQUID AIR, LTD.—The net profits for the year 1925 were £4,788, and £3,551 was brought forward. A dividend of 5 per cent. has been declared and £5,406 carried forward.

SALAR DEL CARMEN SYNDICATE, LTD.—A final dividend of 5 per cent. is announced, making a total of 10 per cent. for the year to December 31 last, in contrast with 25 per cent. paid for 1924.

NITRATE RAILWAYS, LTD.—A final dividend of 12s. per share has been declared on the ordinary shares, making 10 per cent. for the year. A dividend of 6s. per share is also announced on the deferred shares.

AGUAS BLANCAS NITRATE CO., LTD.—Owing to recent unfavourable developments in the nitrate industry the directors have decided not to pay a final dividend in respect of the year to December 31, 1925.

UTAH COPPER CO.—The income for the year 1925 amounted to 11,103,504 dol. and the net revenue was 13,538,102 dol. Three quarterly distributions of 1 dol. per share were made, that for the final quarter being 1.25 dol.

HADFIELDS (LTD.).—The report for the year ended December 31 last states that the net profits were £60,468, after providing for debenture interest, and £80,523 was brought forward. A dividend of 3 per cent. is proposed on the ordinary shares, carrying forward £83,205.

ALIANZA CO.—The gross profit for the year 1925 was £196,000, and the net profit amounted to £77,000. It has been decided to recommend the payment of a dividend of 10s. per share for the year, leaving £206,000 to be carried forward. The annual general meeting will be held in Valparaiso on June 30.

MIRRLEES-WATSON CO.—The agreement recently concluded with Mirrlees, Bickerton and Day leaves the Mirrlees-Watson Co. as holders of shares in that undertaking and certain cash assets. It is proposed to divide these shares and assets among the shareholders, so that each may receive seven Mirrlees-Bickerton shares for every five Mirrlees-Watson shares, and in addition 5s. in cash for each individual Mirrlees-Watson share held.

LAUTARO NITRATE CO.—In their report for the year ended December 31, the local board in Valparaiso states that the profit from the sales of nitrate and iodine and dividends amounted to £1,448,401, and the accumulated reserve funds from the Antofagasta Nitrate Co. of £590,818, makes a total of £2,039,219. Expenses, including those incurred in connection with the increase of capital and the debenture issue, depreciation, and capital written off, totalled £990,706, leaving a net profit of £1,048,513. After adding to this £372,149 brought forward, and deducting the three dividends of 5 per cent. paid during the year, there remains £692,663, which is to be carried forward.

BENZOL AND BY-PRODUCTS, LTD.—The profit and loss account, covering the twelve months from October 1, 1924, to September 30, 1925, after taking into account development work charged to revenue, depreciation, management, commission and all other charges, including the sum of £8,000 set aside for income tax reserve, shows a net loss of £9,469. In the previous period there was a profit of £30,344. Bringing forward the profit balance of £55,836 from that account and adding £2,078, reserves written back, there is a total of £57,915. After deducting the loss of £9,469, preference and ordinary dividends, amounting to £28,414 (confirmed at last annual meeting), also £7,920 representing the preference dividend paid on April 1, 1925, there remains a net profit balance of £12,111 to be carried forward to the next account.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to May 7, 1926.

"FUSOLENE."

465,959. For soldering fluxes in fluid, paste or powder form. Class 1. Charles Ebenezer Challis, trading as Gourmet and Co., 2, Mount Pleasant, Gray's Inn Road, London, W.C.1; manufacturer. January 9, 1926. (To be Associated. Sect. 24.)

Opposition to the Registration of the following Trade Marks can be lodged up to May 14, 1926.

"KOHYDROL."

463,996. For water-softening preparations and compositions for the prevention and removal of incrustation in boilers. Class 1. E. De Haen Aktiengesellschaft (a Joint Stock Company organised under the laws of Germany), Seelze, near Hanover, Germany; manufacturers. November 5, 1925.

"FLORESENE."

B466,064. For disinfectants. Class 2. Alfred Edward Watson, trading as the Swift Manufacturing Co., 67, Cowcaddens, Glasgow, Scotland; manufacturer. January 13, 1926.

"NEKAL."

466,686. For wetting-out preparations, emulsifying preparations and solvents, all being chemical substances for use in the course of manufacture of textile fabrics. Class 1 I.G. Farbenindustrie Akiengesellschaft (a Corporation organised according to German laws), Mainzer Landstrasse 28, Frankfort-on-Main, Germany; manufacturers. February 1, 1926.

"RUSPBRITE."

467,488. For compounds to prevent rust on metal. Class 1. Alan Hargreaves Horne, trading as Industrial Chemicals Co., 38, Moorland Road, Burnley, Lancashire; manufacturers of chemical specialities for industrial purposes. February 24, 1926.

Opposition to the Registration of the following Trade Marks can be lodged up to May 21, 1926.

NAYLOID."

466,298. For cellulose varnishes. Class 1. Naylor Bros. (London), Ltd., Wexham Road, Slough, Buckinghamshire; varnish, paint, enamel and distemper manufacturers. January 20, 1926. (To be associated, Sect. 24.)

"SUCHAR."

465,257. For filtering, clarifying and decolorising carbons. Class 4. Suchar Process Corporation (a Corporation duly organised and existing under and by virtue of the laws of the State of Delaware, United States of America), 19 to 20, Dover Green, Dover, Delaware, United States of America; manufacturers. December 14, 1925.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

ARTIFICIAL SILK YARN.—An agent in Leuze, Belgium, wishes to represent British house for above. (Reference (487.)

BITUMINOUS MATERIALS.—A firm in Berlin-Steglitz wishes to represent British makers of above for roads in Germany, Austria and Czechoslovakia.

POLISH TRADE.—Firms interested in trade with Poland should note that the Commercial Secretary to the British Legation at Warsaw will be available for advice and information at the D.O.T. from May 3 to May 5, interviews by appointment. Write, quoting Reference 6966/1926.

CHEMICALS.—Agents in New York desire to represent British manufacturers for the sale of chemicals on a consignment basis. (Reference No. 566.)

OIL SEEDS.—SOYA OIL.—A French firm in Marseilles desires to secure the agency of British exporters of above. (Reference No. 549.)

A stout fence at the top

or

an ambulance below

Insurance, the wisdom of which no one can doubt, is in most cases but an ambulance at the foot of the great cliff of destruction—fire. Many a fall which cripples and inconveniences beyond measure could be prevented by the erection of a stout barrier—a barrier built of appliances capable of dealing effectively with an outbreak of fire.

The great strides made in building construction have certainly modified the fire hazard of yesterday, but the possibility of a serious outbreak in factory, warehouse, office or home can never be eliminated, for the contents remain inflammable.

Genuine Foamite Appliances

The superior efficiency of genuine Foamite Firefoam apparatus is accounted for by the special qualities of Firefoam Liquid—the foam stabiliser—which is a proprietary article only supplied with charges for use in foam apparatus bearing the Foamite Firefoam trade mark.

Firefoam, which is produced by Foamite Extinguishers, Engines and Installations, is a tough and most heat-resisting foam.

The Action of Firefoam

Firefoam consists of millions of bubbles in which is imprisoned carbon-dioxide gas. It floats upon liquids and adheres to solids, even to ceilings.

When a burning surface is covered with Firefoam, the oxygen of the air is immediately excluded and the flames automatically go out. Because the foam persists, re-ignition is impossible.

For Oil and Other Fires

Firefoam is effective upon fires of every description.

The increasing use of inflammable liquids in connection with various manufacturing processes makes Foamite appliances a necessity.

Recent tests demonstrate that Foamite appliances can be used with safety upon electrical fires.

Firefoam does no damage to materials and gives off no injurious fumes.

At Sea and on Land

Suitable Foamite apparatus is available for the protection of every class of property.

To-day, over 25,000 oil tanks of all sizes, and nearly 3,000,000 tons of British shipping are protected by Foamite installations. In addition, thousands of smaller appliances have been supplied to power plants, works, factories, offices and homes in various parts of the world.

Firefoam not only extinguishes fire, but "insulates" against re-ignition. The flame from a Bunsen burner playea upon the hand covered with Firefoam.

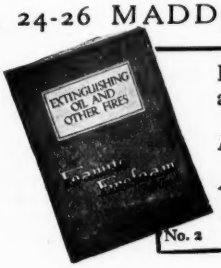
If you instal Foamite appliances you can rest assured that you have the means of combating incipient fires of every description, but Foamite Firefoam Limited offer a complete range of fire-protection devices, including:—

The Firespray Extinguisher.—This is of the soda acid type, and, when operated, gives a powerful jet composed mainly of water. Suitable for use in the case of fires involving loose material, but not upon inflammable liquids.

The Fire-Gun Extinguisher.—This is of the carbon-tetrachloride type, and when the liquid expelled reaches the fire, it changes to a heavy gas, which stifles the flames. The chemical is a non-conductor. A handy appliance for cars.

FOAMITE FIREFOAM LTD., 24-26 MADDOX STREET, LONDON, W.1

Foamite Fire Protection



Please send free copy of "Extinguishing Oil and Other Fires."

Name.....

Address.....

.....

Lever Brothers, Ltd.

A Sound Position

THE annual meeting of Lever Brothers, Ltd., was held on Thursday, April 22, at Port Sunlight and opened with tributes to the first Lord Leverhulme. (Financial details have already appeared in THE CHEMICAL AGE.)

The chairman (Mr. d'Arcy Cooper) surveyed the events of the year which have been recorded in these columns as they arose. Later, dealing with their subsidiary interests, he said that the margarine industry, after cut-throat competition, was at last in a satisfactory position, and their company (Planters' Foods, Ltd.) was able to sell at a reasonable price for the highest qualities and to make profits.

The Niger Co. and the Belgian Congo interests were satisfactory.

An announcement was made to the trade of a reduction in the retail prices of household soaps equivalent to a halfpenny per pound. Home trade in soap was maintained, and the export trade in soap of the United Kingdom was larger to neutral markets of the world than that of the total exports of soap of any other three nations added together.

Reference was made to visits by directors to almost all the leading countries of the world during the year.

During the year also the company had been involved in litigation, including a contract case with Brunner, Mond and Co., Ltd., but their relations with this company were now working smoothly and in a friendly way.

The chairman referred to the vast resources of the company and pointed to the results of this, a bad year in their fishing and oil interests, as indicative of the possibilities of a good year. The total sales of the parent and associated companies amounted in cash to over £81,000,000. The centre of administration for Lever Brothers as a whole was now Lever House, London.

The Marquis of Carisbrooke and Mr. C. R. Baker were appointed directors and a sum of £5,000 was placed at the disposal of the directors for their services.

New Issue of German Potash Bonds

IT is reported that £4,000,000 of Seven per cent. Bonds, forming Series "B" of the Potash Syndicate of Germany, have just been issued. Holland and Switzerland have taken £1,000,000 between them, and the balance of £3,000,000 has been placed privately in London. Permission to deal in these bonds will be sought next week, and it is expected that they will be dealt with at a price of about 97 to 97½, ex dividend. These bonds do not differ in any respect—except that they are called Series "B"—from the £8,000,000 of bonds issued last December and called Series "A." It will be remembered that £5,000,000 was offered for sale in London at 94½, the balance being sold on the Continent. These bonds were dealt in this week at 98¼ and over. The total authorised issue is £15,000,000 sterling, and the present issue brings up the total outstanding amount to £12,000,000. The balance of £3,000,000 has been reserved for issue in New York, if and when that market wants it. If, however, that market should decide not to take the portion reserved for it, presumably the amount would be issued elsewhere, if and when the Syndicate needed the funds.

Grinders and Drum Fillers

IN leaflets issued by J. G. Jackson and Co., of 50, Wellington Street, Glasgow, C.2, are described various apparatus manufactured by them. The Jackson Patent Grinders are compact machines for grinding to fine powder such materials as dry colours, asbestos, soap powder, and many others. The fineness of grind is very easily controlled, and an automatic feeder is provided. The machine is easily accessible for cleaning when it is desired to grind different materials. The Jackson Horizontal Drum Filling Machine has been designed primarily for filling drums with powder where the material has to be filled through a bung hole. It can also be used suitably on large bottles and similar containers. When the drum has been set in position, a clutch is engaged by a lever, which also releases a back-weight attached to a worm spindle, carrying the worm inside the drum. Pressure of material gradually removes the worm from the drum as the filling nears completion, at the end of which the clutch automatically disengages. Alteration in the quantity to be packed is easily secured.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

KOKO-MARICOPAS CO., LTD., London, E.C., hair restorer manufacturers. (M., 1/5/26.) Registered April 16, £2,000 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue, £1,000; charged on all properties, trade marks of the company. *£500. February 16, 1926.

SYLVEX, LTD., London, S.W., manufacturers of chemical compounds. (M., 1/5/26.) Registered April 14, £600 debentures, to W. Wolsey, 29, Gloucester Road, director of companies; general charge.

TEGGIN (WALTER) LTD., Manchester, dyers and cleaners. (M., 1/5/26.) Registered April 7, £500 mortgage or charge, to Cowens (Dyers) Ltd., Union Mills, near Douglas (I.M.); general charge. *Nil. July 5, 1925.

Business Names Registered

[*The following (trading name and address, nature of business, date of commencement, and proprietors' names and addresses) have been registered under the Registration of Business Names Act.*]

WILLIAM SAMSON AND SONS, manufacturing chemists, commenced business on April 12, 1926, at 60, Lambert Street, Sheffield. The registered proprietor is Mr. Archibald W. Jessop.

New Companies Registered

CRAIGBANK CHEMICAL CO., LTD., 170, Buchanan Street, Glasgow. Registered April 20, 1926. Manufacturers and importers of and dealers in chemical, pharmaceutical, medicinal, industrial and other preparations, etc. Nominal capital, £300 in £1 shares.

LANCASHIRE TAR DISTILLERS, LTD.—Registered April 21, 1926. Tar distillers, manufacturers of and dealers in coke, coal, tar, pitch, ammoniacal liquor and other residual products; carbonisers of coal, naphtha distillers, etc. Nominal capital, £100 in £1 shares. Solicitors: Coburn and Co., 6, Drapers Gardens, London, E.C.2.

LEWIS G. LEWIS, LTD., Pontardawe Chemical Works, Pontardawe, Glam. Registered April 23, 1926. Chemical manufacturers. Nominal capital, £30,000 in £1 shares.

NORTH-WESTERN CO-OPERATIVE TAR DISTILLERS.—Registered April 23, 1926. Manufacturers of and dealers in coke, coal, tar, pitch, ammoniacal liquor and other residual products, colours, dyes, dyestuffs, chemicals and chemical products, etc. Nominal capital, £50,000 in £1 shares (46,000 ordinary and 4,000 deferred). Solicitors: Pinsent and Co., Birmingham.

ZOG, LTD., Bebington, near Birkenhead, Cheshire. Registered April 22, 1926. Soap makers, manufacturers of cleansers, varnish makers, manufacturers of and dealers in tallow, oil, glycerine, chemicals, paints, dyes, colours, etc. Nominal capital, £5,000 in £1 shares.

Admiralty and Shale Oil Contracts

MR. BRIDGEMAN, the First Lord of the Admiralty, on Wednesday received a representative deputation from the shale oil industry of Scotland, which urged that in the disposal of contracts for fuel the Admiralty should give the most favourable consideration to the Scottish oil industry. Mr. Bridgeman replied that while he could not commit himself at this stage, as other Departments were concerned, he indicated the probability, after consultation with his colleagues, of being able to give some slight increase in the price already offered by the Admiralty for a contract and the possibility of entering into a contract for a period of years.